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*College of Agriculture, Forestry, Home Economics*

1961-1963



St. Paul Campus Residence Hall—Bailey Hall

**Bulletin**

*of the UNIVERSITY of MINNESOTA*

## How to Use This Bulletin

This bulletin is the basic source of information about the College of Agriculture, Forestry, and Home Economics. You should keep it at hand for ready reference. The Index in the back of the bulletin will refer you to information on specific points.

- I. General Information** ..... Page 7  
General Introduction, Admission Requirements, Registration and Class Attendance, Grading System, Student Personnel Services, Student Government, Student Activities, Student Housing, Scholarships and Awards, All-University Student Loans and Scholarships, Reserve Officers Training Corps.
- II. Curriculums and Requirements** ..... Page 20  
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- III. Description of Courses** ..... Page 63

In addition to this bulletin and any other you may need for program planning, you will be supplied at the time of registration with a copy of the *Class Schedule*. This is published just prior to each quarter and lists courses offered during the quarter, with time and place of class meetings.

### Explanation of Symbols

You will find on page 63 the meaning of the asterisks, daggers, triangles, etc., and the numbers that are given to freshman, sophomore, junior, and senior courses used in the description of courses in section III.

# UNIVERSITY OF MINNESOTA

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## COLLEGE OF AGRICULTURE, FORESTRY, AND HOME ECONOMICS

### Administration

Harold Macy, Ph.D., Dean of the Institute of Agriculture (201 Coffey Hall)  
Keith N. McFarland, Ph.D., Assistant Dean, Institute of Agriculture, and Director of Resident Instruction (202 Coffey Hall)  
John A. Goodding, Ph.D., Assistant Director of Resident Instruction (202 Coffey Hall)  
Ralph E. Miller, M.S., Associate Professor (203A Coffey Hall)  
Wendell J. DeBoer, Ph.D., Assistant Professor (215 Coffey Hall)  
Paul S. Anderson, B.S., Instructor (215 Coffey Hall)  
John M. Fisher, M.A., Supervisor of Admissions and Records, St. Paul Campus (220 Coffey Hall)  
H. Donald Ferris, B.S., M.S.L.S., Librarian of the Agriculture Library (109 Agriculture Library)

### Faculty

#### Agricultural Biochemistry

##### *Professor*

David R. Briggs, Ph.D., *acting head*  
Robert Jenness, Ph.D.  
Irvin E. Liener, Ph.D.  
Walter O. Lundberg, Ph.D.  
Max O. Schultze, Ph.D.  
Fred Smith, Ph.D., D.Sc.

##### *Associate Professor*

Samuel Kirkwood, Ph.D.

#### Agricultural Economics

##### *Professor*

Sherwood O. Berg, Ph.D., *head*  
Willard W. Cochrane, Ph.D.  
Selmer A. Engene, Ph.D.  
Carroll V. Hess, Ph.D.  
Harald R. Jensen, Ph.D.  
E. Fred Koller, Ph.D.  
Truman R. Nodland, Ph.D.  
Philip M. Raup, Ph.D.

*Associate Professor*

Reynold P. Dahl, Ph.D.  
Lee M. Day, Ph.D.  
Darrell F. Fienup, Ph.D.  
Elmer W. Learn, Ph.D.

*Instructor*

Victor F. Amann, B.S.  
Dale C. Dahl, M.S.  
Earl I. Fuller, M.S.  
Roger G. Johnson, M.S.  
Russell G. Thompson, B.A.B.A.

**Agricultural Education**

*Professor*

Milo J. Peterson, Ph.D., *chairman*  
Harry W. Kitts, Ph.D.  
Keith N. McFarland, Ph.D.  
Gordon I. Swanson, Ph.D.

*Assistant Professor*

R. Paul Marvin, Ph.D.

**Agricultural Engineering**

*Professor*

Arthur J. Schwantes, M.S. (Ag.E.), *head*  
Evan R. Allred, M.S. (Ag.E.)  
Andrew Hustrulid, Ph.D.  
Philip W. Manson, M.S. (Ag.E.)  
Charles K. Otis, M.S. (Ag.E.)

*Associate Professor*

Clarence H. Christopherson, M.A.  
Arnold M. Flikke, M.S. (Ag.E.)  
Curtis L. Larson, M.S. (C.E.)  
John Strait, M.S. (Ag.E.)

*Assistant Professor*

William J. A. Culmer, Ph.D.  
Jesse H. Pomroy, M.S. (Ag.E.)

*Instructor*

Roger E. Machmeier, B.S.  
William L. Olson, B.S.  
Arnold K. Solstad, M.S.  
Lewis C. Taylor, M.S.

**Agricultural Journalism**

*Professor*

Harold B. Swanson, M.S., *head*  
Gerald R. McKay, M.S.

*Associate Professor*

Raymond S. Wolf, B.S.

*Instructor*

Maxine Larson, B.A.

**Agromony and Plant Genetics**

*Professor*

Will M. Myers, Ph.D., *head*  
Charles R. Burnham, Ph.D.  
Jean W. Lambert, Ph.D.  
Ernest H. Rinke, Ph.D.  
Leon A. Snyder, Ph.D.

*Associate Professor*

Richard Behrens, Ph.D.  
Laddie J. Elling, Ph.D.  
Robert G. Robinson, Ph.D.  
Alois R. Schmid, Ph.D.  
James C. Sentz, Ph.D.  
Horace L. Thomas, Ph.D.

*Assistant Professor*

Lawence H. Smith, Ph.D.

**Animal Husbandry**

*Professor*

Lester E. Hanson, Ph.D., *head*  
Ralph E. Comstock, Ph.D.  
Alfred L. Harvey, Ph.D.  
Robert J. Meade, Ph.D.

*Associate Professor*

Woodrow J. Aunan, Ph.D.  
Robert M. Jordan, Ph.D.  
Olaf E. Kolari, Ph.D.  
William E. Rempel, Ph.D.

*Assistant Professor*

Frank D. Enfield, Ph.D.  
Jay C. Meiske, Ph.D.  
Joseph V. Scaletti, Ph.D.  
John D. Smith, Ph.D.

**Biometrics (Program in)**

*Associate Professor*

Charles E. Gates, Ph.D.

*Assistant Professor*

James C. Sentz, Ph.D.

**Dairy Husbandry**

*Professor*

Clarence L. Cole, Ph.D., *head*  
Edmund F. Graham, Ph.D.  
Jesse B. Williams, Ph.D.

*Associate Professor*

John D. Donker, Ph.D.

*Assistant Professor*

Charles W. Young, Ph.D.

*Instructor*

Edward V. Caruolo, M.S.  
John C. Wilk, M.S.

**Dairy Industries**

*Professor*

Samuel T. Coulter, Ph.D., *head*  
Harold Macy, Ph.D.  
James J. Jezeski, Ph.D.  
Howard A. Morris, Ph.D.  
Joseph C. Olson, Ph.D.  
Elmer L. Thomas, Ph.D.

*Instructor*

Robert W. Weik, M.S.

**Entomology and Economic Zoology**

*Professor*

Alexander C. Hodson, Ph.D., *head*  
Laurence K. Cutkomp, Ph.D.  
Frederick G. Holdaway, Ph.D.  
William H. Marshall, Ph.D.  
A. Glenn Richards, Ph.D.  
Lloyd L. Smith, Ph.D.

*Associate Professor*

James R. Beer, Ph.D.  
Edwin F. Cook, Ph.D.  
Mykola H. Haydak, Ph.D.  
Allan G. Peterson, Ph.D.  
Thomas F. Waters, Ph.D.

*Assistant Professor*

Marion A. Brooks, Ph.D.  
Roger D. Price, Ph.D.

*Instructor*

John R. Tester, Ph.D.

**Forestry**

*Professor*

Frank H. Kaufert, Ph.D., *director*  
Randolph M. Brown, M.F.  
Donald P. Duncan, Ph.D.  
Henry L. Hansen, Ph.D.  
Ralph L. Hossfeld, Ph.D.  
Scott S. Pauley, Ph.D.  
Louis W. Rees, Ph.D.  
Arthur E. Schneider, Ph.D.

*Associate Professor*

Merle P. Meyer, Ph.D.  
Cherng-Jiann Shiue, Ph.D.

*Assistant Professor*

Egolf V. Bakuzis, Ph.D.  
Bruce A. Brown, Ph.D.  
Frank D. Irving, Ph.D.  
Richard A. Skok, Ph.D.

Edward I. Sucoff, Ph.D.  
Kenneth E. Winsness, M.F.

*Instructor*

Donald G. Butler, B.S.  
Alvin R. Hallgren, M.S.  
William C. Kelso, Jr., M.F.  
William R. Miles, M.F.  
Harold Scholten, M.S.

**Home Economics**

*Professor*

Louise A. Stedman, Ph.D., *director*  
Roxana R. Ford, Ph.D., *assistant director*  
Suzanne Davison, Ph.D.  
Florence A. Ehrenkranz, Ph.D.  
Gertrude A. Esteros, Ed.D.  
Isabel T. Noble, Ph.D.

*Associate Professor*

Charlotte W. Baumgartner, M.A.  
Helen A. Ludwig, M.A.  
Lura M. Morse, Ph.D.  
Juliette I. Myren, M.S.

*Assistant Professor*

Ethel R. Gorham, M.A.  
Mary J. Hitchcock, M.S.  
Kathleen M. Jeary, M.A.  
Esther Y. Trammell, M.S.

*Instructor*

Richard A. Abell, M.F.A.  
Robert J. Forsyth, M.A.  
Lynette J. Hanson, M.S.  
Lois A. Lund, M.S.  
Barbara B. North, M.S.  
Sara C. Steensland, M.S.

**Home Economics Education**

*Professor*

Roxana R. Ford, Ph.D., *chairman*  
Marjorie M. Brown, Ph.D.  
Louise A. Stedman, Ph.D.

*Associate Professor*

Amy J. Holmblade, Ph.D.

*Assistant Professor*

Hedda Kafka, M.A.

*Instructor*

Marie H. Christenson, M.S.  
Ardell H. Wantoch, B.S.

**Horticulture**

*Professor*

Leon C. Snyder, Ph.D., *head*  
Troy M. Currence, Ph.D.

Arthur E. Hutchins, Ph.D.  
Robert E. Nylund, Ph.D.  
Orrin C. Turquist, Ph.D.  
Arthur N. Wilcox, Ph.D.

*Associate Professor*

Theodore S. Weir, M.S.  
Richard E. Widmer, Ph.D.

*Assistant Professor*

Florian I. Lauer, Ph.D.  
Robert A. Phillips, M.S.  
Shirley R. Trantanella, M.S.  
Conrad J. Weiser, Ph.D.

*Instructor*

Emil T. Andersen, M.S.  
Albert G. Johnson, B.S.

**Plant Pathology and Botany**

*Professor*

Milton F. Kernkamp, Ph.D., *head*  
Clyde M. Christensen, Ph.D.  
Carl J. Eide, Ph.D.  
Helen Hart, Ph.D.  
Thomas H. King, Ph.D.  
Albert J. Linck, Ph.D.

*Associate Professor*

David W. French, Ph.D.  
Thor Kommedahl, Ph.D.  
John B. Rowell, Ph.D.  
Roy D. Wilcoxson, Ph.D.

*Assistant Professor*

Neil A. Anderson, Ph.D.  
Richard D. Durbin, Ph.D.  
Karl D. Fezer, Ph.D.  
Donald P. Taylor, Ph.D.

*Instructor*

Roger G. Lambert, M.S.  
Matthew B. Moore, M.S.

**Poultry Husbandry**

*Professor*

Elton L. Johnson, Ph.D., *head*  
Robert N. Shoffner, Ph.D.  
Hubert J. Sloan, Ph.D.

*Associate Professor*

Milo H. Swanson, Ph.D.  
Paul E. Waibel, Ph.D.

*Assistant Professor*

Ray E. Burger, Ph.D.  
David C. Snetsinger, Ph.D.

*Instructor*

Terry B. Kinney, M.S.

**Rhetoric**

*Professor*

Ralph C. Nichols, Ph.D., *head*  
James I. Brown, Ph.D.  
Francis E. Drake, Ph.D.  
Marjorie H. Thurston, Ph.D.

*Associate Professor*

Paul H. Cashman, Ph.D.

*Assistant Professor*

Monica Langtry, B.A.  
Eugene S. Wright, Ph.D.

*Instructor*

Charles A. Carr, M.A.  
John Gill, M.A.  
Richard Horberg, M.A.  
William Marchand, M.A.  
Robert J. Nadon, M.A.  
Starling Price, M.A.  
Donald Richardson, M.A.  
Jim Deane Seeden, B.A.  
Thomas N. Thiss, B.A.

**Soils**

*Professor*

William P. Martin, Ph.D., *head*  
George R. Blake, Ph.D.  
Paul M. Burson, M.S.  
Alfred C. Caldwell, Ph.D.  
John M. MacGregor, Ph.D.

*Associate Professor*

Harold F. Arneman, Ph.D.  
Richard H. Rust, Ph.D.  
E. L. Schmidt, Ph.D.

*Assistant Professor*

Donald G. Baker, Ph.D.  
Rouse S. Farnham, Ph.D.  
Janis Grava, Ph.D.

# *College of Agriculture, Forestry, and Home Economics*

## I. GENERAL INFORMATION

The St. Paul Campus of the University of Minnesota is situated just outside the city limits of St. Paul in the area east of Cleveland and north of Como Avenues. An intercampus bus runs between the St. Paul Campus and the Minneapolis Campus. Students carrying work on the St. Paul and Minneapolis campuses are given a free pass for use on this bus. Most St. Paul Campus students have course work on the Minneapolis Campus as an integral part of their chosen curriculum.

All of the University's work in the fields of agriculture, forestry, and home economics is centered in the Institute of Agriculture. Major units of the Institute include Resident Instruction, the Agricultural Experiment Station, and the Agricultural Extension Service. The dean of the Institute of Agriculture has his administrative offices in 201 Coffey Hall.

Resident Instruction is under a director who is also the assistant dean for the College of Agriculture, Forestry, and Home Economics (often referred to as College of AFHE). This College includes the Schools of Forestry and Home Economics and the various departments in agriculture.

The teaching program of the College of AFHE involves both general and professional education, and at the completion of the various undergraduate programs the bachelor of science degree is awarded. Students may then seek professional employment, enter farming or homemaking or other programs of their own, or begin graduate study. Information on this College program other than that contained in this bulletin may be obtained from the assistant dean for the College of Agriculture, Forestry, and Home Economics, Institute of Agriculture, University of Minnesota, St. Paul 1.

### Admission Requirements

To be admitted to the College of AFHE you must make application to the Office of Admissions and Records, University of Minnesota, St. Paul 1. Listed below are requirements for admission to the programs in agriculture, forestry, home economics, and preveterinary medicine. Other requirements and procedures having to do with nonresident admission, admission with advanced standing, adult special admission, and admission by examination appear in the *Bulletin of General Information*.

**High School Graduates**—High school graduates in the upper 75 per cent of their classes may enter if they have completed 12 units in grades 10-12. Nine of these should be in English, social studies and history, mathematics, natural science, and foreign languages. Distribution of these units with respect to the major areas included in the College program should be as outlined below. Students should note that although higher algebra is not a requirement for admission, it is a prerequisite for required courses in the

majority of curriculums in agriculture and forestry, and in preveterinary medicine. Therefore students are encouraged to secure higher algebra whenever possible.

**Agriculture**—3 units in English, 1 unit in elementary algebra, 1 unit in plane geometry, and 1 or more units in natural science or agriculture.

**Forestry**—3 units in English, 2 units in mathematics (elementary algebra and plane geometry), and 1 unit in natural science.

**Home Economics**—3 units in English and 1 unit in elementary algebra. One unit in home economics may be included in the 9 basic units. Students graduating in the upper 25 per cent of the high school class may enter without regard to high school course pattern.

**Preveterinary Medicine**—3 units in English, 2 units in mathematics (elementary algebra and plane geometry), and 1 or more units in natural science or agriculture. Students wishing to prepare for the College of Veterinary Medicine should apply for admission to the College of Agriculture, Forestry, and Home Economics.

**Graduates of the Schools of Agriculture**—If you are a graduate of one of the University of Minnesota Schools of Agriculture and have completed the 4-year program and 3 summers of supervised project work or the equivalent, and if you were in the upper 75 per cent of your class, you will be admitted to the College of AFHE.

**Adult Special Students**—You may be admitted as a special student if you are a mature person (24 years of age or older) and wish to register for particular courses to meet special needs. Normally, an adult special student will not be in residence for an extended period of time, but only so long as is necessary to secure the information that is specifically desired.

**Non-High School Graduates**—Write the Office of Admissions and Records for information about entering the University by examination. Also, see *Bulletin of General Information*.

**Admission with Advanced Standing**—Credits from other accredited colleges and universities and from other colleges of the University of Minnesota which are appropriate for a student's course of study can be transferred to the College of AFHE. These will be evaluated by the

Office of Admissions and Records and will be designated as either required or elective credit. A course that is applied toward required credit is considered the equivalent of a specific course required in a curriculum here. Experience has shown that transfer credits for courses taken in agriculture, forestry, and home economics are frequently not applicable to courses offered in the junior and senior years, i.e., to courses numbered 50 or over, in the College of AFHE. You will be expected to complete all required courses here and all area requirements regardless of the number of excess elective credits you may have.

Therefore it is important, in transferring to the College of AFHE, to have planned your earlier programs carefully in order that your credits may apply with the greatest efficiency to the particular curriculum you desire to enter. If you are beginning your work in an institution other than the College of AFHE, and plan to transfer at a later date, refer to section II of this bulletin. There you will find descriptions of the curriculums and a listing of the required courses for each. You should note especially the requirements for the freshman and sophomore years. Your college adviser will help you select courses that will meet specific curricular requirements, and if you need further help you may write directly to the Office of Admissions and Records, University of Minnesota, St. Paul 1.

**Transfer of Credit in Agricultural Courses Taken at Minnesota Non-Land Grant Colleges**—Blanket approval will not be given for transfer of credit in agricultural courses from non-land grant institutions. Rather, transfer of credit will be considered on an individual basis.

Recommendation on transfer of credit will be made by the appropriate department of the University of Minnesota to the Advanced Standing Committee of the College of AFHE.

Appraisal of the accomplishment of the student shall be based upon information concerning the course, including course outline and objectives, to be secured from the offering institution, personal contact with the student, and a



review of the course examinations written by the student. When the information at hand does not permit the department to make a judgment with respect to the level and quality of preparation of the student, validating examinations may be administered.

Transfer of credit in courses in agriculture taken in non-land grant institutions shall be limited to introductory courses, or those representative of the first courses in a departmental offering. The special examination for credit will be utilized by students seeking credit in areas covered by advanced courses in agriculture.

**Admission to Curriculums with Special Scholarship Requirements**—Certain curriculums require higher scholastic aptitudes and achievement than others. Admission to this College does not mean, therefore, that you will necessarily be admitted to any curriculum you may select. When you first enter the University, whether you will be permitted to register in a curriculum having special scholarship requirements will depend upon your previous academic record and in part upon the battery of examinations taken at time of entrance. If you are denied admission to a curriculum at first, you can transfer to it later if your scholastic record justifies it. Continuance in the curriculum will depend upon your maintaining the required scholastic average.

Transfer students may, upon entrance, be permitted to register in one of these special curriculums, but continuance in it will depend upon the maintenance of the required scholastic average.

The special scholarship requirements are included in the information on curriculums in section II.

**Examinations upon Entrance**—If you are a new student you will be required to take a college aptitude examination, provided you did not take it in high school. Other examinations given at entrance will test your aptitude and achievement in mathematics and English. Your admission to the University will not depend upon the results of these examinations if you are otherwise qualified.

**Proficiency Examinations in Introductory Courses**—The College of AFHE desires to correlate the courses taught here, as far as possible, with the technical courses taught elsewhere. If you have previously taken considerable work in technical courses, it may be unnecessary for you to repeat all or even part of it. Satisfactory performance on examinations in selected introductory courses will permit you to substitute other courses for these. Students wishing to take proficiency examinations or to secure more information concerning them should contact the college office in 207 Coffey Hall.

For information about taking special examinations for credit, see Index.

## Registration and Class Attendance

**Fees**—For information about fees, see the *Bulletin of General Information*.

**Registration**—The Office of Admissions and Records announces the registration dates for each quarter. If you are accepted for admission, the dates for registering and detailed instructions will be included in the information that is sent to you. Students in residence are informed through the Official Daily Bulletin of the registration dates for each quarter. Faculty advisers will assist you in developing your quarterly program.

**Courses Taken on the Minneapolis Campus**—Students who are enrolled on the St. Paul Campus register for courses, both required and elective, on the Minneapolis Campus. The courses from other colleges of the University that are required in particular curriculums in this College are listed in section II. The many other courses that are available as electives are not listed.

For a complete listing and brief descriptions of courses on the Minneapolis Campus it will be necessary for you to consult the bulletin of the particular col-

lege offering the course. Your adviser will have a copy of these bulletins, and they will be available also at the Office of Admissions and Records and at the Agriculture Library.

At the close of section III you will find a listing and description of courses offered by Minneapolis Campus departments but taught on the St. Paul Campus primarily for St. Paul Campus students.

**Quantity of Work**—The normal load of work for each quarter is 14 to 18 credit hours. A credit hour requires on the average 3 hours each week. These may be distributed as follows: 1 hour of lecture or recitation requiring 2 hours of preparation; 2 laboratory periods requiring 1 hour of preparation; or 3 laboratory periods requiring no outside preparation. Student programs in the College of AFHE may vary in load according to the student's ability or circumstance. To carry more than 18 hours of credit, you must have a C average (that is, a total grade point average of not less than 2.00). To carry more than 21 hours, you must have a B average in work of the previous quarter and must secure permission from the Committee on Student Scholastic Standing.

**Auditors**—The approval of the Committee on Student Scholastic Standing, your adviser, and the instructor is necessary if you wish to register for a course as an auditor. An auditor must enroll officially for a course and must pay the same fee that is charged for regular membership in the class. He does not take the final examination and is not given a grade or credit for the course.

**Changes in Registration**—To change your registration, you must obtain change of registration forms from the Office of Admissions and Records. Changes should be made only when necessary or highly desirable and they should be made as early as possible in a quarter.

During the first 6 weeks you may cancel a course without grade and with only your adviser's approval. After the sixth calendar week you are required to have the approval of your adviser, the instructor, and the Committee on Student Scholastic Standing.

In the College of AFHE, requests to cancel courses in the 2 weeks prior to the beginning of the quarterly final examination period will be approved only in cases of extreme emergency. The instructor must indicate your grade at the time of cancellation. If the grade is passing, you will be permitted to cancel with W on your report, or without grade. If it is failing, this is indicated by a grade of F. A student who is doing failing work and discontinues attending class after the sixth week but does not officially cancel will also receive a grade of F.

During the first week of the quarter you may add a course with the approval of your adviser only. After the first week you must have the approval of your adviser, the instructor, and the Committee on Student Scholastic Standing.

**Cancellation of Entire Registration**—If you leave college before the end of the quarter, you should cancel your registration at the time you discontinue attending class. Cancellation within the first 6 weeks entitles you to a refund proportional to the amount of time you attended class. If you do not attend classes at all, you are entitled to a full refund.

**Class Attendance**—On the St. Paul Campus attendance is compulsory for certain classes only, because of the nature of such classes. If you miss class for good reasons beyond your control, you have the privilege of requesting the instructor's assistance in making up the class work you miss. The instructor is under no obligation, however, to give assistance if you willfully or deliberately absent yourself from class, although there are situations in which he may properly wish to do so.

The following situations will be accepted by instructors as reasons that would justify absence from class and a request for assistance in making up work: (a) illness certified by the Health Service or by the family physician; (b) emergencies caused by a death or serious illness in the immediate family; (c) emergencies approved by the Committee on Student Scholastic Standing; and (d) participation in University-approved, co-

curricular activities (certification that a student was absent from class because he was engaged in such activities will be made by the dean of students).

If you wish to make up work, you should confer directly with the instructor in regard to the justification for your absence and the possibility and ways of making up the class work. The Committee on Student Scholastic Standing will enter into the situation only when special emergencies (item c above) are involved and as an appeal agency.

**Credit Without Class Attendance**—If you wish to secure full credit for a course for which you have adequate training and preparation, you may apply for permission to take a *special examination*. It may be taken during the first quarter in residence without fee; after that time a fee of \$5 is required. Special examinations in which a grade of C or better is earned are recorded with credit and grade, as part of the student's college record.

You may register for a course as a *reading course* (individual work) during the quarter in which the course is regu-

larly offered, with the approval of your adviser, the instructor in the course, and the Committee on Student Scholastic Standing, under the following conditions:

1. When a course normally offered is canceled because of inadequate registration.
2. When, because of conflicts, the student finds it impossible to schedule the course at the time it is offered.

It is assumed that you will complete the work of the course during the quarter in which you are registered for it and take the final examination at the regularly scheduled time.

**Quality Credits**—The number of free elective credits required for graduation may be decreased by 1 for each 5 grade points in excess of those required to reach an average of 2.7. Free electives are those you may choose without regard to curricular or all-College requirements. Not more than one-twelfth of the total number of credits required for graduation may be gained through excess grade points.

## Grading System

The All-University grading system as it applies to undergraduate work in the College of AFHE is as follows:

1. There shall be four permanent grades, A (highest), B, C, and D (lowest), which shall be acceptable for the completion of a single course.
2. There shall be a permanent grade of F (failure) given when a student does not complete successfully the work of a course.
3. There shall be a temporary grade of I (incomplete) which may be assigned when there is not sufficient information immediately available to permit the assignment of a permanent grade. This would be the case if the student has not done all the work of the course or if the instructor does not know why a student, officially registered for his course, has not appeared or has left. If the instructor is able to ascertain that the student has no adequate excuse or if the student attended beyond the sixth week and was failing, F is the appropriate grade.

An I which is not turned into a permanent grade or into a W (official cancellation with approval of the student's college) by the end of the sixth week of the next

regular quarter of attendance shall become an F. (This does not apply to students in the Graduate School or to students in a Master's degree program in undergraduate colleges; their I grades remain until changed by the instructors to some other grade.) Permission to complete the work must be obtained from the instructor. He may set a makeup deadline of less than 6 weeks.

An extension of time may be permitted for removal of I grades upon recommendation of the instructor concerned and with approval of the Scholastic Committee. If the petition is presented after the end of the sixth week of the next quarter of residence, a restoration of the mark of I and the completion of the required work would be considered in the nature of a special examination for which the special examination fee would be required.

4. There shall be a symbol W to indicate official cancellation from a course without grade. This shall be assigned in all cases of official cancellation during the first 6 weeks of classes irrespective of the student's standing. After 6 weeks, W shall be posted only if the student is not failing at the time of official cancellation. W is a registration symbol, not a grade.

5. A student who cancels officially or otherwise leaves a class after the sixth week of classes and is failing at the time shall receive an F.
6. There shall be a symbol X which may be reported in continuation courses in which a student is permitted to continue but in which a grade cannot usually be determined until the sequence is completed. The instructor shall submit a grade for each X when the student has completed the entire sequence.
7. There shall be a registration symbol V (visitor) to indicate registration as an auditor or visitor.
8. There shall be a symbol T (transferred) indicating credits transferred from another institution or from one college to another within the University when a reevaluation is required. It shall be posted as a preceding supplement to the original grade.
9. For purposes of determining scholarship averages, grade points shall be assigned as follows:
 

Each credit of A .....	4 grade points
Each credit of B .....	3 grade points
Each credit of C .....	2 grade points
Each credit of D .....	1 grade point
Each credit of F .....	0 grade points

A student's scholastic average—or grade point average—shall be the sum of grade points divided by the sum of credits passed and failed.

## Student Personnel Services

**Faculty Advisers**—In choosing your curriculum from the many different offerings in the College of AFHE, you will be assisted by a member of the faculty who will become your adviser. Your adviser will interpret the program to you, will guide you in program planning, and will be concerned with your general progress. When you have problems and need special attention, your adviser may refer you to other faculty members, to the college office, or to one of the specialized personnel agencies.

**Committee on Student Scholastic Standing**—Almost every student on occasion makes use of the Committee on Student Scholastic Standing in the College of AFHE. This is a committee of the faculty which interprets and enforces faculty regulations. It also may make exceptions to regulations when they work to the educational disadvantage of a particular student, provided the basic spirit of the regulation is maintained. If you have any questions concerning the interpretation of faculty regulations, you should consult with your adviser or call at the college office. By means of petition, the forms for which are procured in the Office of Admissions and Records, you may request adjustments of your program where departure from normal procedures appears to be justified. These requests, after they have been approved by your adviser, are turned in to your college office.

**Advanced Standing and Enrollment Committee**—If you transfer from another institution to the College of AFHE, your transfer credits are evaluated in the Office of Admissions and Records. You should see the Admissions and Records supervisor if you have any questions about the use of transfer credits. If necessary, you will be referred to members of the Advanced Standing and Enrollment Committee which makes final decisions in evaluating transfer credits in terms of this College and the requirements of the various curriculums.

**Orientation Programs**—The College of AFHE joins with other divisions of the University in helping new students, whether freshmen or those with advanced standing, to get acquainted with one another and with the college program. Usually this involves 2 days of testing, counseling, and group activities.

**College Placement Services**—The College will offer some assistance in helping you secure employment upon graduation. The college office will bring to your attention such job opportunities as are known, and will assist in arranging interviews or contacts with representatives of employing agencies. Many departments are aware of opportunities, and you should ask their help. Specialized placement services are available to students in agricultural education and home economics education.

**All-University Personnel Services**—The personnel agencies listed below are available to you at any time. You may consult them with or without referral from your faculty adviser.

1. For professional help on a personal problem or vocational choice, go to the Student Counseling Bureau, 101 Eddy Hall, Minneapolis Campus, or to the representative on the St. Paul Campus, Coffey Hall.

2. To learn about student activities, visit the Student Activities Bureau in the First Temporary South of Mines, Minneapolis Campus, or go to the St. Paul Campus office in Coffey Hall. The director and the program consultant of the St. Paul Campus Student Center, and the Student Union program consultants in 229 Coffman Union, Minneapolis Campus, are good sources of information and assistance to students wishing to participate in University activities.

3. If you need financial help, apply at the Bureau of Student Loans and Scholarships, 201 Eddy Hall, Minneapolis Campus.

4. For help in finding a room or apartment, consult the Student Housing Bureau, 209 Eddy

Hall, Minneapolis Campus, or the representative in Coffey Hall, St. Paul Campus.

5. For a part-time job on or off campus, apply to the Student Employment Office, 153 Temporary South of Folwell Hall, Minneapolis Campus.

6. For help in improving your reading or other study skills, consult the Rhetoric Department, 230 Agricultural Engineering Building, St. Paul Campus, or the Educational Skills Clinic, 101 Eddy Hall, Minneapolis Campus.

7. For aid with speech difficulties, consult the Rhetoric Department, or the Speech and Hearing Clinic, 205 Shevlin Hall, Minneapolis Campus.

8. If you have any questions about veterans' benefits, go to 102 Administration Building, Minneapolis Campus.

9. Foreign students should keep in contact with the Adviser for Foreign Students, 302 Eddy Hall, Minneapolis Campus.

10. For help with health problems, go to the Health Service on either the St. Paul or Minneapolis Campus.

11. The office of the Co-ordinator of Religious Activities is in 211 Eddy Hall, Minneapolis Campus.

## **Student Government**

**Student Council**—The Student Council directs and co-ordinates student activities and encourages student leadership throughout the St. Paul Campus. Its membership is drawn from all major areas of the College of AFHE and also from the College of Veterinary Medicine.

The council co-operates with the Minnesota Student Association (MSA) and the Senate Committee on Student Affairs. It brings questions from the student body to the administration of the colleges and discusses and reaches decisions on matters of general interest.

**Honor System**—Under the provisions of the Student Self-Government Honor System, the students on the St. Paul Campus, rather than the faculty, conduct examinations and quizzes. The honor system is operated on the assumption that honesty prevails among a large majority of students. Students place themselves on their honor not to give or receive aid during examinations. The responsibility of honesty is between student and student; the faculty does not place the student on his honor. Under

the honor system the faculty permits students to conduct the examinations.

If you observe dishonesty during an examination period, you may take some appropriate step at the time to halt the dishonest act, or may report the incident later to the Honor Case Commission of your college. The Honor Case Commission, comprised of students from the various areas, considers confidentially the various aspects of the situations reported. If it is clear that scholastic dishonesty has occurred, the commission concerned recommends to the Committee on Student Scholastic Standing of the faculty an appropriate action to be taken with respect to the offending student.

The honor system is essentially a preventive, rather than a punitive, system and provides for great freedom of action on the part of students on this campus. New students are urged to discuss the honor system with students previously registered in the College. The membership of the Honor Case Commission is posted in the post office (in Coffey Hall) together with a notice as to how mem-

bers may be contacted for information or assistance.

#### **Student-Faculty Intermediary Board—**

When you have questions or encounter situations with respect to your class work which in your opinion need attention or clarification, you are urged to bring your

problem to the attention of the Student-Faculty Intermediary Board. This is a joint committee of students and faculty who are interested in maintaining helpful relationships between members of the student body and the faculty. The membership of this board is also posted in the St. Paul Campus post office.

## **Student Activities**

The St. Paul Campus offers you a varied program of activities from which you may choose those that suit your individual interests and needs.

Social life is centered largely in the St. Paul Campus Student Center. Many all-campus events are sponsored by the St. Paul Campus Student Center Board of Governors. This student board formulates policy for operation of the Student Center and establishes its budget. The Student Center provides for a varied recreational program in which you are encouraged to participate.

Professional clubs and organizations will contribute to your knowledge of your special field and acquaint you with other students in your own and closely related fields.

Special interest groups enable you to improve in a skill or follow a hobby. Punchinello, a dramatics organization, and the Toastmasters and Toastmistresses clubs, which give experience in public speaking, are typical of these organizations.

An extensive, seasonal, year-round program of intramural sports is offered

for men. Teams are organized on the basis of clubs, fraternities, dormitories, departments, and independent groups.

Co-recreational play nights and splash parties are scheduled for the entire student body. The Physical Education Department furnishes the facilities, equipment, and attendants, and assists in program planning.

Students are encouraged to use the gymnasium and pool on an informal, free-play basis throughout the year.

The churches near the campus have student programs with counselors or directors. The YMCA and YWCA on the Minneapolis Campus are interdenominational and open to all men and women on the campus. The Student Council of Religions helps to co-ordinate the efforts of the various religious organizations on the campus.

St. Paul Campus students are entitled to use the facilities of the Coffman Memorial Union on the Minneapolis Campus. They participate in such activities on the Minneapolis Campus as they choose and of course take part in all-University activities.

## **Student Housing**

Bailey Hall on the St. Paul Campus was opened in September, 1958. It accommodates 156 men and 152 women in separate wings. Requests for information and application forms should be directed to Director, Bailey Hall, University of Minnesota, St. Paul 1.

Brewster Hall on the St. Paul Campus, an older but serviceable residence hall, will accommodate 111 men students. Inquiries should be addressed to Director,

Brewster Hall, University of Minnesota, St. Paul 1.

Meredith Hall on the St. Paul Campus will accommodate a limited number of women students. Inquiries should be addressed to Director, Meredith Hall, University of Minnesota, St. Paul 1.

Rooming and boarding accommodations are available in approved houses near the campus. For information, write

to the Student Housing Bureau, 101 Coffey Hall, University of Minnesota, St. Paul 1.

Students from the St. Paul Campus may also apply for accommodations in the residence halls and co-operative

houses on the Minneapolis Campus. For information about housing facilities there, see the *Bulletin of General Information* and write to the Student Housing Bureau, 209 Eddy Hall, University of Minnesota, Minneapolis 14.

## Scholarships and Awards

Certain scholarships are available to students entering as freshmen in the College of AFHE. Information concerning these scholarships is sent to all Minnesota high schools in January of each year. Further information may be obtained from the Director of Resident Instruction, College of Agriculture, Forestry, and Home Economics, Institute of Agriculture, University of Minnesota, St. Paul 1.

Students entering as freshmen in the College of AFHE may also apply for the all-University freshman scholarships. Students should consult with their high school principals concerning these scholarships, or write to the Director, Bureau of Student Loans and Scholarships, University of Minnesota, Minneapolis 14.

Other scholarships or awards are distributed periodically to students in residence on the basis of specified criteria.

Selection of recipients for most scholarships is based upon academic aptitude, vocational promise, personal attributes, leadership, and, in most but not all of the scholarships, upon financial need. The scholarships and awards specific to students in the College of AFHE are described below.

**Alpha Gamma Rho (Lambda Chapter) Scholarship**—Annual gift of \$150 in memory of the late Edwin A. Hanson, former member of Alpha Gamma Rho, Lambda Chapter, to assist worthy and needy active members of Alpha Gamma Rho, Lambda Chapter.

**Alpha Zeta Traveling Scholarships**—Five awards of \$75 each to assist students of high scholarship and strong professional interests to attend a meeting of an appropriate professional, scientific, or technical society or association. Candidates must be upperclassmen and are nominated by heads of departments.

**Mr. and Mrs. Eugene S. Andrews Scholarship**—One annual scholarship of \$200 for a freshman student in home economics.

**Frank B. Astroth Scholarship**—An annual scholarship of \$200 for a 5-year period (1957-58 through 1961-62) for students majoring in

dairy production. Scholarships are open to regularly classified male students, including entering freshmen, with preference given to Minnesota residents.

**Barzen of Minneapolis, Inc., Scholarship in Agronomy**—Scholarship of \$300 to assist and encourage worthy students, preferably freshmen, who wish to obtain college training in agronomy.

**Borden Agricultural Scholarship Award**—Annual award of \$300 to student entering his senior year in agriculture who has achieved the highest average grade of all similarly classified students in agriculture in all preceding college work. Recipient must have included in his curriculum two or more dairy subjects.

**Borden Home Economics Scholarship Award**—Similar award for senior student in home economics. The recipient must have included in her curriculum two or more courses in food and nutrition.

**Mary L. Bull Scholarship**—A fund of \$500 established by the Alpha Alumnae Chapter of Phi Upsilon Omicron, the interest to be used for special grants or scholarships of \$50 each to needy and worthy students enrolled in home economics.

**Burpee Award in Horticulture**—Annual award of \$100 to a student, preferably a junior, in the regular 4-year course in agriculture with a major in horticulture or its related fields, an interest in flower and vegetable growing, and practical experience.

**Chapman Foundation Scholarships**—Four annual scholarships of \$300 each for freshmen in forestry and 4 annual scholarships of \$200 each for sophomores in forestry, provided by A. Dale Chapman (For. '29), president, Chapman Chemical Company, Memphis, Tennessee, to help and encourage worthy and needy students.

**E. G. Cheyney Memorial Scholarships**—Established by the Minnesota Forestry Alumni Association to stimulate and encourage interest in writing and public speaking by students in forestry. Two annual awards of \$100 each, open to junior or senior forestry students who have demonstrated outstanding ability and improvement in creative writing and speaking skills.

**Chicago Farmers Scholarship**—Annual scholarship of \$200 to a junior in agriculture who will be a senior in the year in which the scholarship is held.

**Walter C. Coffey Scholarship**—Interest from a gift from Mrs. Walter C. Coffey, Minneapolis, Minnesota, in memory of her late husband,

Walter C. Coffey, former president of the University of Minnesota, is used to recognize and encourage scholarship, leadership—including leadership in the religious life of students—and high moral character. Awarded to junior or senior men or women.

**Continental Grain Company Scholarships—**

Two scholarships of \$500 each, open to juniors and seniors in the College of AFHE and in other colleges of the University pursuing study in areas pertinent to the marketing, distribution, or processing of grain.

**Dairy Husbandry Scholarships—**Gifts from Minnesota dairy organizations for 2 or 3 scholarships of \$300 each for regularly enrolled Minnesota students (including entering freshmen) majoring in dairy husbandry.

**Caleb Dorr Prizes for High Scholarship—**

Books and other suitable awards are presented to students who have had 2 or more quarters of work in this College and who have a grade point average of 3.50 or better.

**Caleb Dorr Scholarships and Medals—**Awarded to students for the highest scholastic records, 1 for men and 1 for women, in each class. Scholarships of \$200 each to freshmen, sophomores, and juniors, and gold medals to seniors.

**Federated Garden Clubs of Minnesota Scholarship—**Gift of \$100 for a scholarship to encourage competent and deserving juniors or seniors to complete their college training in landscaping, ornamental horticulture, and floriculture. The recipient shall agree to speak to the assembly of Federated Garden Club members at least once in the fiscal year in which the scholarship is paid.

**A. M. Field Agricultural Education Student Aid Fund—**Established by various donors who share a common interest in vocational agriculture in Minnesota, in honor of the late A. M. Field, Professor Emeritus, Department of Agricultural Education in recognition of his distinguished service and honorable record of achievement in the field of vocational agriculture. Awards will be made to worthy students majoring in agricultural education, and encouragement will be given to individual scholarship recipients to make contributions on an annual basis back to this fund after their graduation in order to perpetuate the fund.

**Dean E. M. Freeman Medal for Student Leadership—**Award of a bronze medal to senior student who has made the greatest contribution to student life on the St. Paul Campus.

**Dean E. M. Freeman Scholarship—**Special achievement scholarships to students making commendable progress in scholarship or leadership under difficult circumstances.

**George F. Ghostley Scholarship—**Scholarship of \$300 to encourage and assist worthy students who have a major interest in the poultry field to enter or to complete their college programs. The award is open preferably to entering freshmen.

**Samuel B. Green Scholarship Medal—**Awarded each year to the student in forestry having the best scholastic record at the end of the fall quarter of the senior year.

**William F. Hagerman Award—**An award of \$25 to a student who has completed 2 quarters in the Technical Certificate Program in Agriculture. Basis of selection: high scholarship, financial need, contributions in leadership and citizenship, and intent to complete the Technical Certificate Program in Agriculture.

**Home Economics Association Scholarship—**Annual \$50 scholarship to a student member of the Home Economics Association, awarded on the following basis: spirit of service, financial need, professional attitude, character, grade point average of 2.50 or above, and ideals and standards consistent with those set up by the School of Home Economics.

**Homelite Forestry Scholarships—**Two scholarships of \$250 each, awarded to juniors or seniors in forestry. The funds are provided by the Homelite Corporation, Port Chester, N. Y., to encourage deserving students to complete their forestry training and thereby promote improvement of forestry practices.

**Hoo Hoo Immortals Memorial Scholarship—**Gifts of \$4,500 from the Twin Cities Hoo Hoo Club (the fraternal order of lumbermen) and \$5,000 from Mrs. Frances B. Partridge of Minneapolis to establish endowment funds, the income from which will be used to provide 1 or more scholarships of \$150 each to juniors in forestry. The cash award is accompanied by a scroll to memorialize the names of the Hoo Hoo Immortals in whose honor this scholarship fund was established.

**International Milling Company Scholarship in Agricultural Biochemistry—**Scholarship of \$300 established to assist and encourage worthy junior or senior students studying in the area of Agricultural Biochemistry, with intention of entering industrial work upon completion of their academic studies. Scholarship shall be the principal measure in determining the recipient, but character, leadership, and financial need may be considered in the process of selection.

**Koronis Mill Turkey Farms Scholarship—**Scholarship of \$300 to encourage and assist worthy students who have a major interest in poultry, especially in the area of turkey production, to enter or complete their college programs. The scholarship is open preferably to entering freshmen.

**Elvira C. Larson Scholarships—**Scholarships of up to \$300 for women majoring in home economics, with preference given to Minnesota residents, and to sophomore, junior, and senior students, although in special cases freshmen may also be eligible.

**Gilbert O. Larson Dairy Industries Scholarship—**Scholarship of \$300 established to help and encourage students majoring in dairy industries. The scholarship is open to regularly classified students, including entering freshmen, from Isanti and Mille Lacs Counties, Minnesota.

**Oscar L. Mather Scholarship Award—**Interest from memorial fund is used to purchase a book each year to be awarded to the student in forestry displaying outstanding scholarship, leadership, and character.

**Medicine Lake Garden Club Scholarship in Landscaping—**Scholarship of \$100 to junior or senior students majoring in landscaping.



**Minneapolis Gas Company Service Scholarship**—Gift of \$500 annually for a service scholarship to aid a qualified third-quarter sophomore or junior in foods and business in home economics. Recipient must express willingness to consider employment in the Home Service Department of the company for a designated period at a mutually agreed upon salary.

**Minneapolis Hide and Tallow Company Scholarships**—Scholarship of \$300 for single, Minnesota male students who major in poultry or swine production. Preference given to seniors, juniors, and sophomores.

**Minnesota Broiler Producers Association Scholarship**—A scholarship of \$300 to encourage and assist worthy students who have a major interest in the poultry field to enter or to complete their college programs. The scholarship is open preferably to entering freshmen.

**Minnesota Dairy Industries Scholarships**—Approximately 10 scholarships of a minimum of \$300 each, made possible through funds contributed by various organizations and individuals interested in encouraging men and women to prepare themselves for professional careers in an area related to dairy products. Open to entering freshmen and qualified undergraduates in the dairy industries curriculum.

**Minnesota Future Farmers of America Foundation Scholarships in Agricultural Education**—One scholarship of \$1,000 to be paid at the rate of \$250 a year for a 4-year period, awarded to a beginning freshman in agricultural education in each year of the period 1958-1961. Basis of selection: capacity for leadership, scholastic ability, practical farm experience, personality, and interest in teaching agriculture in the public schools of Minnesota.

**Minnesota Garden Flower Society Scholarship**—Gift of \$100 from the Minnesota Garden Flower Society for an annual scholarship of \$100, as an aid to a qualified student in the regular four-year course in Agriculture, with a major or minor in horticulture, preferably floriculture. Award based on scholastic ability, interest in floriculture, promise of leadership, and character.

**Minnesota Veterinary Medical Association Scholarships**—Two tuition scholarships for entering freshmen who are Minnesota residents: 1 for a deserving 4-H Club boy or girl and 1 for a deserving FFA boy.

**Moorman Manufacturing Company Scholarships in Agriculture**—Five scholarships of \$300 each for entering freshmen and students in any year of undergraduate work, preferably those interested in animal agriculture.

**National Plant Food Institute Soils and Crops Achievement Scholarship**—A scholarship of \$200 for juniors or seniors with majors in soils or agronomy or plant genetics. In addition, the recipient shall receive an engraved key and shall have his name inscribed on a Plant Industry Club plaque established for this purpose by the donor.

**Northern States Power Company Scholarship**—Annual scholarship of \$300 to a senior in home economics with preference given to

students majoring in home economics in business and home economics education.

**Northwest Feed Manufacturers Association Scholarships**—Four scholarships of \$300 each to be awarded to junior and senior students (sophomores in special cases), one each for majors in animal husbandry, dairy husbandry, poultry husbandry, and agricultural economics or agricultural business administration, and three scholarships of \$300 each for students selected at large. One of the scholarships is to be termed "The Harvey E. Yantis Memorial Scholarship."

**Charles Lathrop Pack Prizes in Forestry**—Prizes of \$60 and \$30 each year to regularly enrolled undergraduate forestry students writing the best essays of a popular nature on forestry.

**F. H. Peavey and Company Undergraduate Scholarship**—Annual \$300 scholarship to aid a junior or senior qualified as follows: must be a graduate of a Minnesota high school and be a major in agronomy, plant pathology, or soils. Also must have demonstrated a continuing interest in cereal crops in Minnesota, have a satisfactory college record, and be in need of financial aid to complete his college education.

**Phi Upsilon Omicron Alumnae Scholarship**—One scholarship of \$150 or 2 of \$100 each from the Twin City chapter to students in home economics, preferably freshmen or sophomores. Awarded on basis of scholarship, personality, and public service.

**Ralston Purina Scholarship**—Annual award of \$500 to a student who will be an incoming senior in the fall quarter and who is majoring in a field closely associated with the feed industry.

**Rhetoric Service Awards**—Annual rhetoric competitions in original oratory, extemporaneous speaking, poetry reading, effective listening, and efficient reading, with first, second, and third prizes of \$25, \$15, and \$10 respectively, and **Lansing Awards in Writing** (informative and creative writing) with two prizes of \$25 and \$10 respectively.

**Ruedlinger Memorial Prize**—Contribution from the Twin City Nurserymen's Association, the income to be used for a prize to the undergraduate presenting the best paper on some horticultural subject.

**St. Paul Campus Faculty Women's Club Scholarships**—Awarded to students in home economics. Number and size of scholarships depend on funds and candidates available.

**Henry Schmitz Student Leadership Scholarship**—One or more annual awards of \$100-\$150 to juniors or seniors in forestry, made possible through funds contributed by alumni of the School of Forestry and through income from a gift of \$4,000 from Stanley J. Buckman (For. '31), president, Buckman Laboratories, Memphis, Tennessee.

**Augustus L. Searle Scholarships**—Scholarships of \$300 each for academically qualified and worthy young women enrolling as freshmen in home economics or in any other program in this College. Preference is given to Minnesota residents.

**Sears-Roebuck Foundation Freshman Scholarships in Home Economics**—Scholarships of \$300 each for rural girls with an expressed interest in home economics as a career, particularly in home economics education or home demonstration work.

**Sears-Roebuck Foundation Scholarships in Agriculture and Forestry**—(a) *Freshman Scholarships*: Scholarships of \$300 each to Minnesota farm boys who enroll as beginning freshmen in agriculture or forestry. (b) *Sophomore Scholarship*: \$300 to the outstanding student in the group of Sears-Roebuck freshman scholars of the previous year.

**Smith-Douglass Company, Inc. Scholarships**—Scholarships of \$300 each, open to entering freshmen in agriculture with an interest in soil science, or to qualified undergraduates with majors in soil science.

**Sonstegard Brothers Scholarship**—Scholarship of \$300 for students majoring in poultry husbandry, preferably entering freshmen.

**Twin City Home Economists in Homemaking Scholarship**—Scholarship of \$150 for students in home economics of any classification.

**Villaume Box and Lumber Company Scholarships in Wood Working**—A quarterly scholarship established to stimulate interest in the processing of forest products and awarded to students of merit in the Building Products Merchandising-Construction and Forest Prod-

ucts Engineering curriculums of the School of Forestry. The award may be made to the same student for all 3 quarters of the academic year, or different students may be recommended each quarter.

**A. D. Wilson-Minnesota Association of Cooperatives Prize Fund**—Interest from this fund is used for prizes totaling \$100 a year for essays on co-operative enterprises and the study of agricultural co-operation. The intent is to stimulate interest in the operation of co-operatives, agricultural co-operation, and effective writing.

**Florence Munson Wilson Memorial Scholarship**—Scholarship of \$50 for a student demonstrating a high quality of scholarship, personal character and integrity, and exceptional promise in his or her chosen field.

**Harold K. Wilson Scholarship**—Scholarship of \$200 to be awarded to worthy and needy students, preferably sophomores, juniors, or seniors.

**Xi Sigma Pi Scholarship Recognition**—The freshman in forestry with the highest scholastic rating has his name engraved on a permanent honor plaque in the School of Forestry office, maintained by the forestry scholastic honor society, Xi Sigma Pi. The sophomore, junior, and senior with the highest scholastic average is awarded a year's subscription to a technical or professional forestry journal.

## All-University Student Loans and Scholarships

**Loans**—The Bureau of Student Loans and Scholarships, 201 Eddy Hall, Minneapolis Campus, administers loan funds that have been set up to help students who are making normal progress toward an educational objective. Usually a student must have finished 2 quarters at the University before a loan will be granted,

but emergency needs get special consideration.

**Scholarships**—This bureau also administers scholarships open to all students of the University. These include scholarships for entering freshmen as well as for upperclassmen.

## Reserve Officers Training Corps

The University of Minnesota is a land-grant institution which offers instruction in military science in accordance with the provisions of the Morrill Act of 1862. Through co-operation with the Army, Navy, and Air Force, it is possible for men students to qualify for a commission as a reserve officer at the same time that they complete their technical and professional training. Other students who may not wish to complete one of the training programs may register for part of the training and earn elective credits.

If you are a citizen of the United States and physically qualified, you should investigate thoroughly the opportunities that are offered in these programs. All of the programs comprise a 4-year course of instruction and some summer training. If you are a veteran, you may be given credit in the Army and Air program for all or part of the first 2 years of basic instruction. If you are a nonveteran, you should register for a program as early as possible in your freshman year so that you will have time to complete it before you graduate.

In the military and air science programs you are furnished with uniforms and textbooks. If you are accepted for advanced training, you will be given a monthly monetary allowance and will be paid for summer training in addition.

The naval science program provides for two kinds of students, Regular and Contract. Regular students are selected on the basis of nationwide competitive examinations. The Navy provides tuition, fees, textbooks, uniforms, and a \$600-a-year living allowance. If you are selected for this program, you are expected to complete it and, when you graduate, to accept a commission as ensign in the USN or second lieutenant in the USMC. You will also be required to serve on active duty for 4 years unless released earlier.

Contract students are civilians who enter into a contract with the Navy. If

you wish to enter this program, you must make a formal application for admission into it. If accepted, you will be provided with uniforms and textbooks and, during your junior and senior years, you will be paid a subsistence allowance. Upon completing the program, you will be granted a commission as ensign in the USNR or as second lieutenant in the USMCR and will be required to serve on active duty for 2 years unless released earlier. If you desire, you may apply for a commission in the regular Navy or Marine Corps.

For more detailed information about these programs you should consult the *Bulletin of the Army-Navy-Air Force ROTC*. Also you may make inquiries personally or by letter at the following offices in the University Armory: Military Science, room 106; Naval Science, room 203; Air Science, room 3.

## II. CURRICULUMS AND REQUIREMENTS

The College of Agriculture, Forestry, and Home Economics offers professional training leading to a wide variety of occupational outlets in the areas of agriculture, forestry, home economics, and related fields. Preprofessional preparation for veterinary medicine is also secured in this college program.

In this section of the bulletin you will find information relating to curricular offerings and to special requirements leading to graduation. The description of course offerings in each area follows as section III.

### DEGREES OFFERED AND GRADUATION REQUIREMENTS

**Degrees Offered**—This College offers 2 groups of curriculums with degrees granted as follows: (a) 4-year and 5-year curriculums leading to the degree of bachelor of science or other Bachelor's degree, (b) fifth-year curriculums leading to the professional Master's degree in agricultural education and home economics education. In addition, a 60-credit program leading to a certificate (the Technical Certificate Program in Agriculture) is offered by the College to students interested in a terminal, collegiate program leading to farming or related activity.

**Requirements for Bachelor's Degrees in Agriculture, Forestry, and Home Economics**—Candidates will be recommended for graduation after completing the following requirements: (a) the prescribed curriculum, including required and elective credits to make the total number of

credits given in the following table; (b) an average of 2 grade points per credit—i.e., the cumulative grade point average must be 2.00 or more. For additional quality requirements, see statements of prescribed curriculums; (c) requirements for all students as noted (see page 22); (d) the residence and other general University requirements for graduation (see *Bulletin of General Information*).

**Requirements for Certificate from Technical Certificate Program in Agriculture**—Candidates will be recommended for the certificate after completing 60 credits of the prescribed curriculum with a cumulative grade point average of 2.00 or more.

**Summary of Credit Requirements**—(See Tables 1 and 2.)

**Graduation with Honors**—Undergraduate degrees may be awarded "with distinction" or "with high distinction." If you should fail to meet in full the requirements stated below, your case will be referred to the Committee on Student

Table 1. Requirements for Bachelor's Degree

Course of Study**	Credit Requirement	Degree Conferred
Agricultural Business Administration .....	192	Bachelor of Agricultural Business Administration
Agricultural Education .....	204	Bachelor of Science
Agricultural Science .....	192	Bachelor of Science
Dairy Industries .....	198	Bachelor of Science
Fishery and Wildlife Management .....	198	Bachelor of Science
Forestry .....	204	Bachelor of Science
Home Economics .....	185	Bachelor of Science
Landscaping .....	192	Bachelor of Science
Science Specialization .....	192	Bachelor of Science

\*\* For graduation requirements in agricultural engineering (professional 5-year course) and agricultural engineering business administration, see *Bulletin of the Institute of Technology*. For graduation requirements in agricultural journalism, see *Bulletin of the College of Science, Literature, and the Arts*.

Scholastic Standing for individual consideration.

The degree is granted "with distinction" if you attain a minimum grade point average of 3.00 for the entire curriculum. If you are a transfer student

feels himself in difficulty rather than to wait until he has already received a poor grade.

In some curriculums, as indicated in the curricular descriptions following, a higher grade point average is required.

Table 2. Requirements for Professional Advanced Degrees

Course of Study	Four-year Credit Requirement (B.S. degree)	Fifth-year Credit Requirement	Degree Conferred
Agricultural Education .....	204	45	Master of Education
Home Economics Education .....	185	45	Master of Education

with less than 2 years of work in this College you will not be eligible for graduation with distinction. However, if you complete one-half the number of credits required for graduation in any curriculum, you will satisfy the 2-year residence requirements. Recommendations to the faculty for the degree "with distinction" are made through the Committee on Student Scholastic Standing on the basis of scholarship and other evidence of satisfactory achievement and advancement in the course pursued.

Your degree will be granted "with high distinction" if you attain a minimum grade point average of 3.50 for the entire curriculum. The same conditions for residence and recommendation apply as for the degree "with distinction."

If you are completing the curriculum in agricultural education or home economics education, you will be checked for your standing in student teaching as well as for the requirements stated below.

### SCHOLARSHIP REQUIREMENTS

**Satisfactory Progress**—As a student in this College you are expected to make satisfactory progress in the curriculum you have selected. This is interpreted to mean a C average. The cases of students who are not reaching this standard are considered by the Committee on Student Scholastic Standing. It is always best for a student to see his class instructor or his faculty adviser as soon as he

**Scholastic Probation**—If a student's scholastic work should be considerably below a satisfactory level of performance, he will be placed on probation and his program or work will be restricted as seems advisable to the Committee on Student Scholastic Standing.

A student will be placed on probation if, at the end of 3 quarters of work or earlier, he has not attained a grade point average of 1.75. At the end of 6 quarters or earlier, he will be placed on probation if he has not attained a grade point average of 1.90.

**Exclusion from College**—Students may be excluded from the College under one of the following headings:

1. *Dropped for Low Scholarship*—When it becomes apparent that a student's work is of a quality that will not lead to graduation, he will be dropped and usually will not be permitted to apply for readmission until 9 months later.

A freshman is dropped when his grade point average is less than 1.50 after 2 or 3 quarters of work in this College. A sophomore is dropped if his average is less than 1.75 after 6 quarters (or 5 quarters if he began his freshman work in the winter or spring quarter). When the factors which contributed to the unsatisfactory work have been removed or satisfactorily corrected, a student may petition for permission to return. Otherwise, he is encouraged to make other plans.

2. *Hold for Committee Clearance*—Sometimes a student's scholastic difficulty indicates that he should not continue for the time being even though the record hardly requires official drop action. In such case his later return must be approved by the Committee on Student Scholastic Standing.

3. *Discontinued*—If a student is pursuing an appropriate course but is handicapped by conditions he cannot control (ill health, neces-

sary outside work, etc.) he may be required to discontinue his registration until these conditions have improved. When discontinuance takes place at any time other than the end of the quarter, the courses for which he is registered may be recorded as canceled without grade (W).

**Readmission**—If a student is dropped, he may not return without the permission of the Committee on Student Scholastic Standing. Credits earned at other institutions during the period of suspension will not apply toward graduation from this College unless permission to earn such credits was given in advance by the Committee on Student Scholastic Standing. If he is permitted to return, he will be placed on probation and may be dropped again at any time when his work is unsatisfactory.

### CLASSIFICATION OF STUDENTS

**Sophomore**—If you are within 18 credits of the number usually earned in your curriculum for the first year and if you have completed 3 quarters of college work, you will be classified as a sophomore. The 3 quarters may include time spent at another institution of collegiate rank. A sophomore who lacks not more than 12 credits of being a junior and who has a B average may be permitted to register for courses in the 100 group. Students who have not attained junior classification and who are below a C average will not be permitted to register for courses numbered 100 or above for which graduate credit is given.

**Junior**—A total of 90 credits with a grade point average of at least 2.00 and completion of the rhetoric communications requirement is required for junior classification.

**Senior**—To be classified as a senior, you must not be more than 9 credits short of the number required for the first 3 years in your curriculum.

**Transfer Students**—If you transfer from a college outside the University and enter this College as a junior, you should have a grade point average of not less than 2.00 at the end of your first year. If you do not have this aver-

age, you will be classified as a sophomore.

### REQUIREMENTS FOR ALL STUDENTS

**Communications**—You will be required to earn 9 credits in the Freshman Communication program, with the exceptions noted in 1 and 2 below.

1. If after completion of 9 credits in Freshman Communication courses you have not yet reached an acceptable level of proficiency, you will be requested to continue in this program until such proficiency is secured, but with 9 credits in Freshman Communication the maximum quantity to be applied toward graduation. Only the last 9 credits taken will be included in determining the student's grade point average.

2. All freshmen will take Rhet 2 (3 credits) which deals with the form and composition of term papers, including making a thorough acquaintance with the library and its resources. However, in completing the remaining 6 credits of the 9-credit Freshman Communication required, if you have demonstrated high proficiency in the communication skills area you may be permitted at the discretion of the Rhetoric Department to substitute credits in specified sophomore rhetoric courses for credits in the Freshman Communication courses.

Transfers from other college programs with fewer than 9 credits in Freshman Communication or its equivalent will be placed in the program here on the basis of their needs as revealed by the diagnostic testing program of the department.

**Humanities Requirement**—All students will complete 9 credits in the area of humanities before graduation. Courses may be chosen from humanities or from the areas of art, HE 120 (Art History), literature, music, philosophy, or theater arts. Studio courses in art and music, chorus, and technical courses may not be applied to this curriculum.

**Mathematics Placement Tests**—All students entering curriculums in agriculture and forestry will be examined on their mathematics background during the registration procedure. Those students wishing to register for Math Y, Higher Algebra, whose background in elementary algebra proves inadequate will be required to take a refresher course at extra cost to them. Students completing higher

algebra and trigonometry in high school will not be required to repeat these courses in college if test results indicate acceptable proficiency.

Students will be notified in advance as to the nature of the content of the placement tests. A thorough review will be needed if one is to demonstrate proficiency on the mathematics placement examinations.

**Orientation**—During your first quarter on this campus you are required to attend orientation lectures, unless you are a transfer with a year or more of work in another college.

**PubH 3, Personal Health, or PubH 2, Personal and Public Health**—Men students on this campus are required to take PubH 3 or 2 or pass the exemption examination. This examination must be taken, however, during your first quarter in college. The date on which it is given is published each quarter in the Official Daily Bulletin.

The public health courses required of women students in home economics vary somewhat with the different curriculums and are listed there. Women registered in curriculums in agriculture and forestry which include PubH 3 or 2 must meet the requirement as stated in the preceding paragraph.

Students in agricultural education and home economics education will substitute the College of Education requirement in public health for PubH 3 or 2.

**Social Science Requirements**—For graduation from the College of AFHE you must complete a total of not less than 15 credits in social science courses. These credits include those specifically required in your curriculum. Courses must be selected from at least 2 of the following fields, with a minimum of 5 credits in each of the 2 fields selected: agricultural economics, anthropology, economics, geography, history, political science, psychology, social science, and sociology. Technical courses such as accounting, statistics, or psychology of learning may not be applied toward this requirement.

**Rhet 51, Exposition**—Before you graduate from the College of AFHE you

must demonstrate proficiency in written composition. Most students satisfy this requirement by taking Rhet 51 during their junior or senior year. If your Freshman English (or Communications) was above average, however, you may take an exemption examination which is given once a quarter at a time specified by the Department of Rhetoric. A course in advanced composition taken in some other college cannot be used to satisfy this requirement.

**Physical Education**—Students in agriculture and forestry are not required to take courses in physical education. Students registered in home economics are required to take a total of 3 credits in this area. Not more than 9 credits in physical education may be counted toward graduation in curriculums other than home economics.

## JUNIOR-SENIOR PROGRAM

**Specialization**—In your sophomore year, after you have completed the equivalent of 5 quarters of residence, you are required to submit to the Office of Admissions and Records a specialization card which has been approved and signed by your adviser. On this card you indicate your choice of a major and minor group or one of the outlined curriculums. If this specialization card is not filed at the designated time, your registration may be withheld.

The major or minor sequences or the outlined curriculum, as indicated on your specialization card, becomes your curriculum required for graduation. Copies of the approved curriculum are sent to you, to your adviser, and to the Committee on Student Scholastic Standing. In case the major is changed to a different field of work, a new adviser must be selected and your specialization card resubmitted.

**Electives**—You should consult with your adviser as to your choice of electives.

Electives taken by students registered in the College of AFHE may, upon approval of adviser and the Committee on Student Scholastic Standing, be omitted

from the courses offered for graduation. These electives, in amounts not to exceed 10 credits, may be withheld (from the list of courses counted toward a degree) to raise the grade point average only in instances relating to the securing of junior classification or in meeting the graduation requirement of 2.00. After a course has been withheld from the undergraduate record as authorized above, it shall not be reinstated other than by special examination or through repeating the course.

A maximum of 9 credits in music may be used as elective credits toward graduation, with not more than 6 of these in Mus 43, 44, 45, or in Concert Band.

**Credit in the Graduate School**—Credits for advanced courses earned while you are an undergraduate, even

though in excess of those required for the baccalaureate degree, can be transferred to the Graduate School only under the following conditions: (a) If you lack not more than 9 credits of undergraduate work, taking into account required and sequence courses, you may carry a limited amount of graduate work (approved courses numbered 100 or above) for graduate credit, such courses not to be applied toward an undergraduate degree. The conditions as stated apply to the beginning of the quarter in which you are taking the courses for graduate credit. The transfer of credit must be arranged by petition to the Graduate School. (b) If you lack not more than 6 credits for graduation, taking into account required and sequence courses, you may register in the Graduate School.

## A. CURRICULUMS IN AGRICULTURE

The curriculums in agriculture provide collegiate training for a great variety of technical and professional positions. The requirements for each curriculum, the vocational possibilities offered by each, and the course of study are described in the material given below. The curriculums are as follows:

1. Agricultural Business Administration
2. Agricultural Education
3. Agricultural Science
4. Dairy Industries
5. Fishery and Wildlife Management
6. Landscaping
7. Science Specialization
8. Preveterinary Medicine
9. Curriculums Relating to Agriculture, Offered Jointly with Other Colleges in which Students Register in Other Colleges: (a) Agricultural Engineering (Professional); (b) Agricultural Journalism
10. Technical Certificate Program in Agriculture

Those students wishing college level work in agriculture, but who are undecided as to their field of specialization or to the length of time they will remain in college, may pursue individualized programs developed with the aid of faculty advisers. Many such students will wish to explore the possibilities in the Technical Certificate Program in Agriculture. The following courses in agriculture are available to entering freshmen and may be entered without prerequisites:

AgEc 1—Principles of Economics I  
 Agro 1—Introduction to Agronomy  
 AnHu 1—Introductory Animal Husbandry  
 DyHu 1—Elements of Dairying  
 DyHu 11—Milk Production  
 Ent 1—Insect Life  
 For 1A—Conservation of Natural Resources  
 For 10—Farm Forestry

Hort 1—General Horticulture  
 Hort 10—Ornamental Horticulture  
 MeAg 4—Agricultural Shop—Metalwork  
 MeAg 7—Farm Building Construction  
 MeAg 12—Agricultural Machinery  
 MeAg 14—Farm Buildings  
 PoHu 1—Poultry Production  
 Soil 1—Soil Management and Conservation



## 1. Agricultural Business Administration)

This curriculum is offered jointly with the School of Business Administration. It is designed for those who wish to prepare for some branch of business which relates to agriculture, such as the marketing of farm products, farm finance, farm implements, farm real estate, country merchandising and the like. More opportunity is offered for business and economics courses than in the agricultural science curriculum, where greater stress is on purely agricultural subjects.

In the first 2 years students register and pay fees in the College of AFHE. In the last 2 years they register in this College and in the School of Business Administration and pay the fees of the latter.

At least 90 credits and a grade point average of 2.00 are required for admission to the junior class and for joint registration. Approximately  $\frac{1}{3}$  of the last 2 years is elective and may include approved courses in any college as well as advanced courses in agriculture and economics.

Students must meet the all-College requirements for graduation from the College of AFHE. However, students are not required to select major or minor fields under this program. Students completing the curriculum, which totals 192 credits, will receive the degree of bachelor of agricultural business administration.

### MINIMUM BASIC REQUIREMENTS

Public health—2 credits

PubH 3—Personal Health (2)  
(or) PubH 2—Personal and Public Health (2)

Orientation—1 credit

Orie 1—Orientation (1)

Rhetoric—15 credits

Rhetoric—Freshman Communication requirement (9)

Rhet 22—Public Speaking (3)

Rhet 51—Exposition (3)

Economics—9 credits

AgEc 1—Principles of Economics I (3)

AgEc 2—Principles of Economics II (3)

AgEc 3—Principles of Economic Analysis (3)

Principles of accounting—9 credits

BA 24, 25, 26—Principles of Accounting (9)

Mathematics—5 credits

Math 10—College Algebra (5)

Biological science—7 credits

Biol 1A-2A—General Biology (7)

Physical science—10 credits

InCh 4-5—General Inorganic Chemistry (10)  
(or) NSci 1-2—Orientation in the Natural Sciences (10) (Students taking NSci 1-2 will be required to take Biol 1-2 [with laboratory] rather than Biol 1A-2A [with demonstration])

Natural science—3 to 5 credits—to be selected from the following:

AgBi 1A—Introduction to Biochemistry (5)

MicB 53—General Bacteriology (5)

MeAg 23—Beginning Physics (5)

Ent 1—Insect Life (3)

Geol 1—General Geology (3)

Introductory courses in agriculture—12 to 18 credits—4 courses to be selected from among the following:

Agro 1—Introduction to Agronomy (4)

AnHu 1—Introductory Animal Husbandry (4)

DyHu 1—Elements of Dairying (3)

Ent 1—Insect Life (3)

For 10—Farm Forestry (3)

Horticulture—(3)

Mechanized agriculture—(3)

PIPa 1—Plant Pathology (5)

(or) PIPa 51—Forestry Pathology (5)

PoHu 1—Poultry Production (3)

Soil 1—Soil Management and Conservation (4)

### ADDITIONAL REQUIREMENTS

Humanities—9 credits

To be selected from humanities, art, HE 120 (Art History), literature, music, philosophy, theater arts (see Index)

Social science—12 credits

Psy 1-2—General Psychology (6) and 6 credits to be selected from anthropology, geography, history, political science, social science, sociology

Agricultural Economics

AgEc 30—Agricultural Prices (3)

AgEc 40—Principles of Marketing Organization (3)

AgEc 50—Farm Finance (5)

Biom 90—Introductory Statistics (3)

AgEc 108—Agricultural Policy (3)

AgEc 110—Economics of Agricultural Production (3)

AgEc 127—Economics of Food Consumption and Distribution (3)

(or) AgEc 131—Market Prices (3)  
 AgEc 140—Grain Marketing (3)  
 (or) AgEc 141—Dairy Marketing (3)  
 (or) AgEc 143—Livestock and Poultry Marketing (3)  
 AgEc 144—Co-operative Organization (3)  
 (or) AgEc 150—Advanced Farm Finance (3)  
 (or) AgEc 170—Land Economics (3)

#### School of Business Administration

BA 58—Business Law: Contracts (3)  
 BA 60—Business Policy and Management Control (3)  
 Econ 65—Intermediate Economic Analysis: The Firm (3)  
 Econ 66—Intermediate Economic Analysis: Income and Employment (3)  
 Econ 68—Elements of Public Finance (3)  
 Econ 69—Government Regulation of Business (3)

## RECOMMENDED ELECTIVES

### Agricultural Economics

AgEc 82—Farm Planning (3)  
 AgEc 147—Marketing Accounting (3)  
 AgEc 172—World Agriculture (3)  
 Biom 100—Introduction to Statistical Analysis I (3)

### School of Business Administration

BA 50—Production Management (3)  
 BA 52—Modern Industrial Relations: Labor Marketing (3)  
 BA 53—Risk Management and Insurance (3)  
 BA 54—Transportation I: Principles (3)  
 BA 56—Corporation Agriculture (3)  
 Econ 67—Money and Banking (3)  
 Econ 103—Economic Development (3)  
 Econ 104—International Economics (3)

## 2. Agricultural Education

This curriculum, offered jointly with the College of Education, is designed for students who plan to teach agriculture in public schools and communities of Minnesota. It is appropriate to the needs of agricultural extension workers and others preparing to farm or to work in rural areas. Agricultural education provides comprehensive training in technical agriculture and permits emphasis upon such fields as dairying, agronomy, agricultural economics, horticulture, animal husbandry, soils, and mechanized farming. In addition, it offers the special training in education needed to qualify students for certification as agriculture instructors in public health schools.

During the first 2 years the student completes required work in the agricultural education curriculum or the equivalent in other agricultural curriculums. In his junior and senior years he completes a combined curriculum of the College of Education and the College of AFHE, leading to a bachelor of science degree.

In the third quarter of their sophomore year, students should make application for the combined curriculum at the Office of Admissions and Records, Coffey Hall. They will then complete admission requirements of the College of Education, which include speech, health, and psychological examinations, and interviews.

Students may complete minors in agriculture departments. Such a minor consists of 18 credits exclusive of introductory courses. For minors in high school teaching subjects see *Bulletin of the College of Education*.

Students wishing to major in agricultural education must:

1. Have lived on a farm until the age of 16 or have had 2 full years of farming experience after that age.
2. Complete the student teaching requirement.
3. Earn a minimum of 204 credits for graduation including all-College requirements.
4. Complete the following requirements (students may wish to take proficiency examinations or special examinations for credit in certain of the following listed required courses—see Index):

### FRESHMAN YEAR

Agro 1—Introduction to Agronomy (4)  
 AnHu 1—Introductory Animal Husbandry (4)  
 Biol 1-2—General Biology (10)  
 DyHu 1—Elements of Dairying (3)  
 Ent 1—Insect Life (3)  
 Hort 1—General Horticulture (3)  
 (or) Hort 6—Fruit Growing (3)  
 (or) Hort 32—Vegetable Growing (3)  
 InCh 4-5—General Inorganic Chemistry (10)  
 Math Y—Higher Algebra (3 or 5)  
 MeAg 4—Agricultural Shop—Metalwork (4)  
 Ori 1—College Orientation Lectures (1)

Rhetoric—Freshman Communication requirement  
Soil 1—Soil Management and Conservation (5)

### SOPHOMORE YEAR

1. Freshman courses not completed
2. The following courses may be taken any quarter they are offered except that the proper sequence of continuation courses and prerequisites must be observed:

AgEc 1—Principles of Economics I (3)

(and) AgEc 2—Principles of Economics II (3)

AgEd 20—Rural Education and Community Leadership (3)

MicB 53—General Bacteriology (5)

Humanities—(9) to be selected from humanities, art, HE 120 (Art History), literature, music, philosophy, and theater arts (see Index)

MeAg 23—Beginning Physics (5)

Mechanized agriculture (6) to be selected from the following:

7—Farm Building Construction (3)

12—Agricultural Machinery (3)

39—Rural Sanitation and Water Supply (3)

45—Engines and Tractors (3)

106—Hydrology and Erosion Control (3)  
(cannot be taken until jr yr)

Psy 1-2—General Psychology (6)

Social science requirement (see Index)

3. In the second or third quarter of the sophomore year, students shall apply for admission to the College of Education and the joint curriculum of agricultural education.
4. At the beginning of the junior year and upon being admitted to the College of Education, students shall have a grade point average of 2.30 in all courses taken in the following areas: agricultural economics, agronomy, animal husbandry, dairy husbandry, dairy industries, entomology, forestry, horticulture, mechanized agriculture, plant pathology, poultry, soils.

### JUNIOR-SENIOR YEARS

1. The following courses if not previously taken:

AgEd 56—Rural Education Through Extension Methods (3)

AgEd 81—Teaching Agriculture in the Secondary School (4)

AgEd 91—Supervised Teaching Experience (6)

AgEd 101\*\*—Young Farmer Education in Agriculture (4)

AgEd 103\*\*—Adult Education in Agriculture (4)

AgEd 104—Planning Programs (3)

Agro 30—Principles of Genetics (3)

Ed 55B—Introduction to Secondary School Teaching (5)

MeAg 130\*\*—Instructional Methods in Farm Mechanics (3)

PIPa 1—Plant Pathology (5)

PubH 50—Personal and Community Health (3)

(or) PubH 5—Individual and Public Health (3)

(Transfer students or others who have already taken PubH 3 should take PubH 4 or 51)

Rhet 22—Public Speaking (3)

Rhet 51—Exposition (3) (cannot be taken earlier than jr yr)

2. Have a grade point average of 2.50 or higher in 15 courses selected from at least 8 of the following areas:

AgEc 12, 80, 82

Agro 1, 21, 27, 30

AnHu 1, 30, 36, 37, 62, 63, 64, 65

DyHu 1, 11, 121, 122, 123

Ent 1, 50

For 10

Hort 1, 6, 10, 32

MeAg 4, 7, 12, 39, 45, 106, 130

PIPa 1, 3

PoHu 1, 51, 52, 154

Soil 1, 20, 21

VMC 52

### RURAL EDUCATION

A curriculum in rural education designed to prepare students for teaching in rural schools is administered by the College of Education. For detailed information about this curriculum see the *Bulletin of the College of Education*.

### FIFTH YEAR LEADING TO PROFESSIONAL DEGREE

The College of Education and the College of AFHE will award the master of education (M.Ed.) degree to students who satisfactorily complete a fifth year of work in agricultural education at the graduate level and who meet all of the regulations for the professional degree.

Undergraduates who expect to qualify for the M.Ed. degree should confer with their advisers by the beginning of the junior year so that the work of the junior, senior, and fifth years may be coordinated to best advantage.

The requirements that must be completed for the professional degree are stated in the *Bulletin of the College of Education*.

\*\* For agricultural education majors, this course must be taken concurrently with AgEd 91 or by consent of instructor.

### 3. Agricultural Science

The agricultural science curriculum offers general preparation leading to a variety of possible specializations. Normally more students are enrolled in this curriculum than in any of the other curriculums in agriculture.

In agricultural science, major emphasis in the first 2 years is directed toward securing the background in science and agriculture and the skills in communications that are needed for more specialized study at a later date. Considerable flexibility in programming is provided, to accommodate different levels of preparation and different interests of entering students.

After 2 years, though sometimes earlier, the student chooses a field in agriculture with which he wishes to become particularly well acquainted. He calls this field his major, and plans to earn at least 24 credits in courses specific to the major field or in very closely related courses. Normally a major field of specialization will be concentrated within one subject matter department. He also selects a minor field, which is usually related to the major or supplementary to it, and plans to earn at least 18 credits in this field. The greater part of his last 2 years is spent in completing the requirements for his major and minor specializations within the agricultural science curriculum.

A complete listing of the areas from which the student in agricultural science may choose his major and minor fields is given on page 30. When a freshman entering this College knows the area in which he wishes to specialize at a future date, he may choose his faculty adviser from the faculty in the department concerned.

**Vocational Opportunities**—The vocational opportunities for graduates from this curriculum are too varied to permit listing. They may differ from one area of specialization to another. In general, agricultural science includes all those vocations in which a technical knowledge of at least some fields of agriculture is required and put to immediate and prac-

tical use. If a student wishes to enter graduate study or work in a highly specialized field, he should discuss his plans with the department concerned.

Among the vocations for which agricultural science offers training are the following:

1. General farming and many kinds of specialized farming.
2. Industrial and commercial enterprises dealing with agricultural products such as creameries, meat packing plants, flour mills, canneries, feed products enterprises, and seed and plant nurseries.
3. Industrial and commercial enterprises dealing with materials used chiefly in production, such as agricultural machinery, dairy and creamery supplies, feeds, insecticides, herbicides, and seeds.
4. Business concerns that deal largely with rural people, such as co-operatives, banks, insurance companies, marketing organizations, and railroads.
5. A great variety of federal, state, and other governmental agencies and bureaus, such as soil conservation, agricultural adjustment, inspection services, and extension programs.
6. A considerable variety of special jobs such as park and golf course supervisors, technicians in the manufacture and distribution of farm products, control of insect and plant pests, and seed production and improvement.
7. Students desiring to specialize in soil and water conservation can develop sound programs in this area by selection of appropriate major and minor sequences in the agricultural science curriculum.

These are illustrative of the opportunities. Students interested in preparing to teach agriculture in the high schools should enroll in the agricultural education curriculum. Students interested in rural education are referred to the *Bulletin of the College of Education*.

Students in agricultural science anticipating employment in agricultural extension are urged to discuss the development of their program with a member of the extension staff, as well as with their faculty adviser. This contact should be established prior to or at the beginning of the senior year, since extension activity may suggest completion of special area requirements not usually included in agricultural science programs.

**Farm Experience**—Farm or specialized experience is desirable, and failure to have such experience may be a deterrent to employment after graduation. Consult your adviser concerning the farm or specialized experience that may be required by your major department.

## GENERAL REQUIREMENTS

To graduate in agricultural science the student must complete the all-College requirements for students in this College including the social science requirement of 15 credits and the humanities requirement of 9 credits (see Index). A total of 192 credits must be earned.

## COURSE REQUIREMENTS

The courses listed below as required are considered fundamental and necessary to any training in agricultural science and should, if possible, be completed before the end of the sophomore year. Some modification in the requirements may be permitted when the student has a definite objective for which substitutes for certain required courses appear desirable. To secure approval for substitutions, the student submits a petition to the Committee on Student Scholastic Standing accompanied by a recommendation from his adviser requesting the change.

If any of these courses are not completed in the first 2 years, they must be given precedence over other courses in the junior year. A student should plan his program well in advance so that time conflicts between courses will be eliminated. Since some courses are offered only 1 quarter each year, careful planning is necessary. In addition to the re-

quirements listed, the student may be scheduled for the programs offered in the Army, Navy, or Air Force ROTC.

## REQUIRED COURSES

Students may wish to take proficiency examinations or special examinations for credit in certain of the following listed required courses (see Index).

### FRESHMAN YEAR

Introductory courses in agriculture—4 courses to be selected from among the following:  
 Agro 1—Introduction to Agronomy (4)  
 AnHu 1—Introductory Animal Husbandry (4)  
 DyHu 1—Elements of Dairying (3)  
 Ent 1—Insect Life (3)  
 For 10—Farm Forestry (3)  
 Horticulture—(3)  
 Mechanized agriculture—(3)  
 PIPa 1—Plant Pathology (5)  
 (or) PIPa 51—Forest Pathology (5)  
 PoHu 1—Poultry Production (3)  
 Soil 1—Soil Management and Conservation (4)  
 Biol 1-2—General Biology (10)  
 (NOTE—*Agricultural economics* majors may select Biol 1A-2A with department approval)  
 InCh 4-5—General Inorganic Chemistry (10)  
 OrCh 41—Elementary Organic Chemistry (4)  
 (NOTE—*Agricultural economics* and *mechanized agriculture* majors may substitute AgBi 1A, Introduction to Biochemistry, for OrCh 41 and balance of organic chemistry and biochemistry requirement)  
 Math Y—Higher Algebra (5 or 3)  
 Math 10—College Algebra (5)  
 Orie 1—College Orientation Lectures (1)  
 PubH 3—Personal Health (2)  
 (or) PubH 2—Personal and Public Health (2)  
 Rhetoric—Freshman Communication requirement (9)

### SOPHOMORE YEAR

Freshman courses not completed, including 4 introductory courses  
 AgEc 1—Principles of Economics I (3)  
 AgEc 2—Principles of Economics II (3)  
 AgBi 3—Introduction to Biochemistry (3)  
 AgBi 5—Plant Biochemistry (3)  
 (or) AgBi 6—Animal Biochemistry (3)  
 MicB 53—General Bacteriology (5)  
 MeAg 23—Beginning Physics (5)  
 OrCh 42—Elementary Organic Chemistry (4)  
 Humanities—9 credits to be selected from humanities, art, HE 120 (Art History), literature, music, philosophy, theater arts (see Index)  
 Social science—(See Index for 15-credit social science requirement)

### JUNIOR-SENIOR YEARS

The following courses should be taken in the junior year if not previously taken:

Rhet 22—Public Speaking (3)

Rhet 51—Exposition (3) (cannot be taken earlier than jr yr)

### ADDITIONAL REQUIREMENTS

In addition to the general and specific requirements listed previously, students will complete a major and a minor.

A major consists of from 24 to 36 credit hours, to be selected from 1 of the groups or subgroups listed below.

A minor consists of a minimum of 18 credit hours, to be selected from a different main group from that of the major or in a related department in some other college of the University.

The student shall not be permitted to list the introductory courses in his major and minor groups as part of the 24 and 18 credits required for the major and minor. With the approval of the major department, he may list for major or minor credit one introductory course in a group other than his major or minor groups. The latter course may also have been used to satisfy the basic requirement of four introductory courses.

A student may select a second minor from a field of work differing from that of the major and first minor. This minor must be approved by the department concerned.

Courses from departments other than those offering the specialization or from other colleges of the University may be applied as major or minor credits if they are clearly related or fundamental to the major or minor specialization. Those courses listed as specific requirements in the agricultural science curriculum may not be applied to the major or minor sequences except for the one introductory course, referred to above, which may be listed for major or minor credit.

By the end of the sophomore year every student is required to file in the Office of Admissions and Records a specialization card. This card lists the courses he proposes to take to complete his major and minor and must be approved by his adviser. Since the student is held responsible for all courses listed on the specialization card, careful planning is important. Changes in choice of

major or minor or of courses listed in these fields on the specialization card which has been submitted must be made either by petition or by submitting a new specialization card.

### SPECIALIZATIONS OFFERED

The following areas of specialization are available as major or minor fields in the agricultural science curriculum. The specializations in agricultural biochemistry, plant genetics, and plant pathology and botany are usually selected under the science specialization curriculum, and students wishing to major in these fields under agricultural science must secure approval for entrance by petition at the time the specialization card is submitted.

Agricultural biochemistry

Agricultural economics (see also agricultural business administration)

Agricultural education (minor only, on approval of the Department of Agricultural Education; students selecting a minor in agricultural education will not obtain a pattern of courses that will permit their being recommended for a teaching certificate)

Agronomy and plant genetics

a. Agronomy

b. Plant genetics

Animal husbandry

Dairy husbandry

Dairy industries (minor only)

Entomology and economic zoology

a. Entomology (minor only)

b. Wildlife management (minor only)

Forestry (minor only)

Horticulture (for landscaping major, see special landscaping curriculum)

Mechanized agriculture (courses offered in the Department of Agricultural Engineering)

Plant pathology and botany

Poultry husbandry

Soils

### SPECIAL MAJORS AND MINORS

Students desiring to develop special major or minor sequences not specifically indicated among the specializations offered may request approval for the special major or minor by petition of the Committee on Student Scholastic Standing. The petition must have been approved by the student's adviser.

## 4. Dairy Industries

The various dairy industries apply the principles of science, engineering and management in the processing of milk and the manufacture, storage, distribution, and utilization of products made wholly or in part from milk. Vocational opportunities include areas of management, procurement, production technology, production evaluation, sales, advertising, research, teaching, and governmental regulatory work. In addition to the basic requirements for dairy industries, complementary courses of study are outlined for each of four areas of emphasis: microbiology, agricultural biochemistry, plant management, and public health. Courses in other areas can be arranged depending upon the interest of the student, e.g., dairy engineering.

The curriculum for the freshman and sophomore years is designed to give the student a thorough background of basic courses essential to a fundamental knowledge of milk, its products, and the manufacture of these products. While some specialization may start as early as the sophomore year, work with dairy products and in the areas of emphasis is generally reserved for the junior and senior years. A total of 198 credits, including 2 summers of practical experience in an approved dairy plant, is required for graduation.

### BASIC REQUIREMENTS

#### FRESHMAN YEAR

AgEc 1—Principles of Economics I (3)  
(and) AgEc 2—Principles of Economics II (3)  
(or) Econ 1-2—Principles of Economics (6)  
DInd 1—Elements of Dairying (3)  
DInd 2—Elements of Dairying Laboratory (2)  
InCh 4-5—General Inorganic Chemistry (10)  
Math Y—Higher Algebra (3 or 5)  
Math 10—College Algebra (5)  
Biol 1-2—General Biology (10)  
Oric 1—College Orientation Lectures (1)  
PubH 3—Personal Health (2)  
(or) PubH 2—Personal and Public Health (2)  
Rhetoric—Freshman Communication requirement

#### SOPHOMORE YEAR

AgBi 3—Introduction to Biochemistry (3)  
AgBi 10—Dairy Chemistry (5)

MicB 53—General Bacteriology (5)  
DInd 3—Judging Dairy Products (1)  
DInd 4—Dairy Products Practice I (3)  
DInd 50—Dairy Bacteriology (5)  
OrCh 41-42—Elementary Organic Chemistry (8)  
(or) OrCh 61-62—Elementary Organic Chemistry (8)

#### JUNIOR-SENIOR YEARS

1. Freshman-sophomore courses not completed
2. Rhetoric courses  
Rhet 22—Public Speaking (3)  
Rhet 51—Exposition (3) (cannot be taken earlier than jr yr)
3. Complete social science and humanities requirements (see Index)
4. MeAg 70—Dairy Engineering (3)
5. Dairy industries courses  
DInd 5—Dairy Products Practice II (3)  
DInd 100—Dairy Industries Literature Seminar (2)  
DInd 101—Condensed Milk Products (3)  
DInd 102—Dry Milk Products (3)  
DInd 103—Market Milk (3)  
DInd 104—Ice Cream and Frozen Dairy Foods (3)  
DInd 105—Butter (3)  
DInd 106—Cheese (3)  
DInd 107—Technical Control of Dairy Products (3)  
DInd 130—Advanced Dairy Products Judging (1)

### AREAS OF EMPHASIS

In addition to the basic requirements for dairy industries, the student must select one of the following areas as well as sufficient electives to meet the requirements for graduation.

#### Microbiology) 10 de

In this area, the attention of the student is directed to the theory and application of the microbiological sciences in their relation to dairy products.

To the courses listed under basic requirements add:

AnCh 57—Quantitative Analysis (4)  
DInd 151—Advanced Dairy Bacteriology (3)  
MicB 116—Immunology (4)  
MicB 102—Medical Bacteriology (4)  
MicB 103—Soil Microbiology (4)  
MicB 121—Physiology of Bacteria (3)  
InCh 11—Semimicro Qualitative Analysis (4)  
MeAg 24, 25—College Physics I, II (8)  
(or) Phys 4-5—General Physics (10)

**Agricultural Biochemistry**

This area of emphasis is designed for the student seeking a more basic and fundamental approach to the chemistry of milk and its products.

To the courses listed under basic requirements add:

- AnCh 57—Quantitative Analysis (4)
- AgBi 100-101-102—General Biochemistry (9)
- AgBi 110—General Biochemistry Laboratory (2)
- InCh 11—Semimicro Qualitative Analysis (4)
- MeAg 24, 25—College Physics I, II (8)
- (or) Phys 4-5—General Physics (10)

**Management**

This area of emphasis is designed for the student wishing training to meet the problems of the business and economic phases of the dairy industry.

To the courses listed under basic requirements add:

- AgEc 3—Principles of Economic Analysis (3)
- AgEc 40—Marketing Organization (3)
- AgEc 141—Dairy Marketing (3)
- MeAg 23—Beginning Physics (5)

Select a minimum of 12 credits from the following courses with at least 3 credits in business administration.

- AgEc 25—Principles of Accounting (4)
- AgEc 50—Farm Finance (5)
- (or) Econ 67—Money and Banking (3)
- AgEc 108—Agricultural Policy (3)
- AgEc 127—Economics of Food Consumption and Distribution (3)
- BA 55D—Analysis of Financial Statements (3)
- (or) AgEc 144—Co-operative Organization (3)
- AgEc 147—Marketing Accounting (4)
- BA 28—Business Law (3)
- BA 50—Production Management (3)
- (and) BA 60—Business Management (3)
- BA 52—Modern Industrial Relations: Labor Marketing (3)
- BA 55C—Managerial Costs (3)
- BA 58—Business Law: Contracts (3)
- BA 77—Advertising (3)
- BA 82—Modern Labor Relations (3)
- BA 117—Sales Management (3)

- IE 50—Elements of Industrial Engineering and Management (3)
- Biom 90—Introductory Statistics (3)

**Public Health**

This area of emphasis provides the necessary background for the variety of activities of the sanitarian in either government or industrial employ related to the grading and quality control of raw materials and finished products in the dairy and other food fields.

- PubH 53—Introduction to Public Health (5)
- (or) PubH 100—Elements of Preventive Medicine and Public Health I (3)
- PubH 75—Introduction to Environmental Sanitation (3)
- (or) PubH 102—Environmental Sanitation I (3)
- PubH 95—Principles of Human Nutrition (3)
- PubH 115—Food Sanitation (3)
- PubH 110—Biometric Principles (3)
- PubH 111—Biostatistics Laboratory (2) or equivalent
- PubH 117-118-119—Sanitary Biology (9)
- MeAg 23—Beginning Physics (5)

**Other Areas**

The courses presented for the four areas above may not satisfy the needs of every student. With the aid of his adviser, a student may set up a course of study designed to meet specific requirements in another area of emphasis.

**SUGGESTED ELECTIVES**

(To supplement basic and area requirements)

- AgBi 103
- AgEd 20, 56
- AgJo 53
- MicB 112, 123
- DyHu 11
- FTec 101, 102, 104
- Jour 18
- MeAg 3
- PoHu 1, 154
- Psy 1, 2, 156
- PubH 103

**5. Fishery and Wildlife Management**

This curriculum prepares students in basic biology and in related fields essential to the fishery and wildlife technician. Qualified students are advised to continue their training in the Graduate School where a wide variety of speciali-

zations, all dependent upon basic technical knowledge, is possible. Among them are fishery, bird and mammal management in relation to other land uses on public and private lands, research in the ecological or economic phases of such



management, teaching or extension programs in colleges or schools, and improvement of hunting or fishing on public or privately owned areas.

Fishery and wildlife management has important relations to the following government and private enterprises: United States Fish and Wildlife Service, state conservation departments, United States and state forest services, national and state park services, and soil conservation programs.

The curriculum requires 198 credit hours for graduation which includes 8 credits at the Forestry and Biological Station, Itasca State Park.

All students must complete certain basic courses. The order, as follows, may represent more than 17 credit hours per quarter in some years. In such cases courses not scheduled during the required year must be taken at the first opportunity available.

#### FRESHMAN YEAR

Biol 1-2—General Biology (10)  
 Ent 2—Introduction to Fishery and Wildlife Management (1)  
 Math 10—College Algebra (5)  
 Math 40—Mathematical Analysis I (5)  
 MeAg 3—Technical Drawing (3)  
 Orie 1—College Orientation Lectures (1)  
 Pol 5—American Government and Politics (5)  
 PubH 2—Personal and Public Health (2)  
 (or) PubH 3—Personal Health (2)  
 Rhetoric—Freshman Communication requirement (9)

#### SOPHOMORE YEAR

AgEc 1—Principles of Economics I (3)  
 AgEc 2—Principles of Economics II (3)  
 Bot 50—General Plant Ecology (3)  
 (and) Bot 50A—General Plant Ecology Laboratory (2)  
 Humanities—(9) to be selected from humanities, art, HE 120 (Art History), literature, music, philosophy, and theater arts (see Index)  
 InCh 4-5—General Inorganic Chemistry (10)  
 InCh 11 (4) and AnCh 57 (4) or OrCh 41-42 (8)  
 MeAg 24, 25—College Physics I, II (8)  
 Rhet 22—Public Speaking (3)  
 Social science—(see Index for 15-credit social science requirement)

Soil 3—Forest Soils (3)  
 Zool 56—Comparative Anatomy (5)  
 Zool 83—Genetics and Eugenics (3)  
 (or) Agro 30—Introduction to Genetics (3)

#### JUNIOR YEAR

1. Freshman and sophomore courses not completed
2. General courses
  - Biom 90—Introductory Statistics (3)
  - Bot 52—Elementary Taxonomy (3)
  - Ent 52—Introductory Entomology (5)
  - Ent 64—Fishery and Wildlife Populations (3)
  - For 4—Dendrology (3)
  - InCh 11 (4) and AnCh 57 (4) or OrCh 41-42 (8) if not taken previously
  - MeAg 42—Surveying (4)
  - Rhet 51—Exposition (3)
  - Zool 50—Introduction to General Physiology (5)
  - Zool 57-58—Introductory Ornithology (6)  
 (or) Zool 57—Introductory Ornithology (3)  
 and MicB 53—General Bacteriology
  - Zool 65—Animal Ecology (3)
  - Zool 121—Ichthyology (3)
3. Biological Station at Itasca State Park (Summer Session) is required. Two of the following courses must be taken:
  - Bot 112—Aquatic Flowering Plants (4)
  - Bot 155—Freshwater Algae (4)
  - Ent 162—Ecology of Terrestrial Vertebrates (4)
  - Zool 119—Limnology (4)

#### SENIOR YEAR

Biom 100—Introduction to Statistical Analysis I (4)  
 Ent 63—Mammalogy (4)  
 Ent 65—Fishery and Wildlife Management (3)  
 Ent 166—Wildlife Management Techniques (3)  
 (or) Ent 171—Techniques in Fishery Biology (3)  
 Geol 1—General Geology (3)  
 Geol A—General Geology Laboratory (2)  
 Zool 53—Fauna of Central United States (5)

#### RECOMMENDED ELECTIVES

AgBi 3, 6  
 Clas 24  
 Ent 118  
 For 10, 55, 59, 104  
 German (15 credits)  
 Math 53, 54  
 PIPa 53  
 Rhet 52, 54  
 Russian (15 credits)  
 Zool 51, 59

## 6. Landscaping

This curriculum is intended for students who plan to make landscaping a lifetime career. It is designed to give the student a broad background in the basic arts and sciences and to give him the courses that will prepare him best for his chosen career. Emphasis in this curriculum is placed on landscaping home grounds, schools, churches, hospitals, commercial and public buildings.

Students must meet the all-College requirements for graduation from the College of AFHE. All students must have 6 months' practical experience in a landscape nursery. A total of 192 credits will be required for graduation.

### FRESHMAN YEAR

Art 1—Principles of Art (5)  
 Biol 1-2—General Biology (10)  
 Hort 1—General Horticulture (3)  
 (or) Hort 6—Fruit Growing (3)  
 (or) Hort 32—Vegetable Growing (3)  
 InCh 4-5—General Inorganic Chemistry (10)  
 Math T—Trigonometry (3)  
 MeAg 3—Technical Drawing (3)  
 Oric 1—College Orientation Lectures (1)  
 PubH 3—Personal Health (2)  
 (or) PubH 2—Personal and Public Health (2)  
 Rhetoric—Freshman Communication requirement (9)

### SOPHOMORE YEAR

AgBi 1A—Introduction to Biochemistry (5)  
 Ent 1—Insect Life (3)  
 Hort 10—Ornamental Horticulture (3)  
 Hort 21-22—Plant Materials (6)  
 Humanities—(9) to be selected from humanities, art, HE 120 (Art History), literature, music, philosophy, and theater arts (see Index)  
 MeAg 42—Surveying (4)  
 MeAg 23—Beginning Physics (5)

## 7. Science Specialization

This curriculum provides for intense specialization in the sciences basic to many fields of agriculture. Only that amount of technical training in practical agriculture is required which deals with the special science or field selected.

Social science—(see Index for 15-credit social science requirement)  
 Soil 1—Soils and Soil Management (5)

### JUNIOR YEAR

AgEc 1—Principles of Economics I (3)  
 AgEc 2—Principles of Economics II (3)  
 Bot 50—Plant Ecology (3)  
 Hort 36—Plant Propagation (3)  
 Hort 40—Horticulture Practices (2)  
 Hort 51—Garden Flowers (3)  
 Hort 60—Principles of Landscape Design (3)  
 Hort 61—Principles of Planting Composition (3)  
 PIPa 51—Forest Pathology (5)  
 Rhet 22—Public Speaking (3)  
 Rhet 51—Exposition (3)

### SENIOR YEAR

Hort 62—Special Problems in Landscape Design and Composition (6-12)  
 Soc 106—City Planning (3)

## RECOMMENDED ELECTIVES

Art 10—Photography (3)  
 Art 20—Elements of Drawing (2)  
 Art 23—Drawing and Design I (3)  
 BA 24—Accounting (3)  
 BA 28—Business Law (3)  
 Bot 10—Minnesota Plant Life (3)  
 Bot 131—Field Ecology (5)  
 Ent 56—Forest Entomology (5)  
 Geol 1—General Geology (3)  
 MeAg 7—Farm Building Construction (3)  
 MeAg 106—Hydrology and Erosion Control (3)  
 PIPa 141—Insects in Relation to Plant Diseases (3)  
 Rhet 54—Advanced Public Speaking (3)

## OTHER REQUIREMENTS

Minor—18 credits (recommended in one of the following: art, botany, entomology, plant pathology, plant industry)

The curriculum is designed as a preparation for teaching in colleges and universities, for research and experimental work in experiment stations, for regulatory, experimental, and extension service in the state and federal departments of

agriculture, forestry, and home economics, and in the industries related to these fields. For opportunities offered in the various fields the student is advised to consult with the departments and with the assistant dean for the College of AFHE.

Only those students who have a high school record considerably above the average, who are capable of maintaining a high scholastic record in college, and who desire to delve deeply into specialized fields of science should attempt to follow this curriculum. In general, it is assumed that students who complete the undergraduate curriculum will spend 1 or more years in graduate study. Success in graduate study is usually predicted upon an undergraduate scholarship record which is distinctly above average. In order to qualify for possible graduate fellowships or assistantships, it is essential that a student maintain a grade point average of 3.00 in his undergraduate work.

Attention is called to the modern language requirement for graduate students. In most departments 1 foreign language is required for the Master's degree and 2 foreign languages for the degree of doctor of philosophy. Proficiency in at least one language, preferably German, should be acquired during the undergraduate years. The modern language requirement is interpreted to mean either German or French unless some other language is recommended by the student's major adviser.

The curriculum requires 192 credit hours for graduation and is made up of required courses with such options as are indicated, and major, minor, and electives.

Students who have not earned a grade point average of 2.50 in the freshman and sophomore years should not plan to continue in science specialization and will be permitted to do so only upon written recommendation of the adviser and with the approval of the faculty committee on science specialization.

For the all-College requirements for graduation from this College, see Index.

Detail of programming will be worked out with the help of a major adviser.

## SPECIFIED MINIMUM REQUIREMENTS BY AREA

**Agriculture, introductory courses—9-14 credits—3 courses to be selected from among the following:**

Agro 1—Introduction to Agronomy (3)  
AnHu 1—Introductory Animal Husbandry (4)  
DyHu 1—Elements of Dairying (3)  
Ent 1—Insect Life (4)  
For 10—Farm Forestry (3)  
Horticulture—(3)  
Mechanized agriculture—(3)  
PlPa 1—Plant Pathology (5)  
(or) PlPa 51—Forest Pathology (4)  
PoHu 1—Poultry Production (3)  
Soil 19—Intermediate Soils (4)

**Biology—10 credits**

Biol 1-2—General Biology (10)

**Biometrics—3 credits**

Biom 90—Introductory Statistics (3)

**Chemistry—28-29 credits**

InCh 4-5—General Inorganic Chemistry (10)  
InCh 11—Semimicro Qualitative Analysis (4)  
OrCh 41-42—Elementary Organic Chemistry (8)  
(or) OrCh 61-62—Organic Chemistry (8)  
AgBi 3—Introduction to Biochemistry (3)  
AgBi 5—Plant Biochemistry (3)  
(or) AgBi 6—Animal Biochemistry (3)

**Economics—6 credits**

AgEc 1—Principles of Economics I (3)  
AgEc 2—Principles of Economics II (3)  
(May be credited toward social science requirement)

**Genetics—3 credits**

**Humanities—9 credits**

To be selected from humanities, art, HE 120 (Art History), literature, music, philosophy, and theater arts (see Index)

**Mathematics—11-13 credits**

Math Y—Higher Algebra (3 or 5)  
Math T—Trigonometry (3)  
Math 10—College Algebra (5)

**Microbiology—5 credits**

MicB 53—General Bacteriology (5)

**Modern Language—9-15 credits**

If German is selected, requirement will be Ger 24-25-26—Chemical German (9) or Ger 1-2-3—Beginning German (15). Students taking Ger 24-25-26 are advised also to take Ger 41-42—Readings from German Chemical Periodicals (2 cr per qtr)

**Orientation—1 credit**

Orie 1—College Orientation Lectures (1)

Physics—8 credits

Public Health—2 credits

PubH 3—Personal Health (2)  
(or) PubH 2—Personal and Public Health (2)

Rhetoric—15 credits

Rhetoric—Freshman Communication requirement (9)

Rhet 22—Public Speaking (3)

Rhet 51—Exposition (3)

Rhet 52—Technical Writing (3)

Social Science—15 credits

To be selected from agricultural economics, anthropology, economics, geography, history, political science, psychology, social science,

sociology (see Index for social science requirement)

Major Sequence—24 credits

A sequence of at least 24 credits in any department offering a major. (The student shall not be permitted to list the introductory courses in his major group as part of the 24 credits required for the major. With the approval of the major department, he may list for major credit one introductory course in the group other than his major group. The latter course may also have been used to satisfy the basic requirement of three introductory courses in agriculture.)

Electives

Elective credits to bring the total to 192 credits

## 8. Preveterinary Medicine

A career in veterinary medicine requires 2 years of study in a preprofessional curriculum and 4 years in the professional curriculum. The University of Minnesota provides opportunities for completion of the entire course of study. The 2-year course of preparation for the professional curriculum is offered in the College of AFHE. The preveterinary studies may be completed at any other accredited college that offers the required courses.

Veterinary medicine is the medical science dealing with the health and reproduction of domestic animals. Veterinary practice is concerned with the recognition, treatment, prevention, and eradication of animal diseases. The study of veterinary medicine embraces a thorough knowledge of the fundamental biologic sciences dealing with animal functions and disease. The veterinarian must also learn to integrate this knowledge and properly utilize it in his professional activities.

The veterinarian may choose one or more fields of work available to him upon completion of his training, graduation, registration, and accreditation. Many veterinarians are engaged in private practice. A private practice may be a general one, meaning that all types of animals are cared for, or it may be specialized and deal with only one or two species of animals. In the latter category, veterinary work may consist primarily of small

animal practice, dairy cattle practice, poultry practice, sheep and range cattle practice, swine practice, horse practice, or reproduction management practice.

In addition to private practice the veterinarian finds professional opportunities in several other fields. Many veterinarians are employed by the Agricultural Research Service of the United States Department of Agriculture where they are engaged in a wide variety of activities. Some of the responsibilities of this branch of the federal government are the supervision of quarantine regulations imposed on animals entering the United States, identification and eradication of such diseases as tuberculosis, brucellosis, foot and mouth disease, rinderpest, contagious pleuropneumonia, hog cholera, or any other serious threats to health of our livestock. They also carry on research pertaining to animal diseases of nationwide importance.

In the armed forces veterinary officers are responsible for the wholesomeness of food supplies, and defenses against biological warfare. Others serve in similar capacity in the United States Public Health Service where they investigate diseases of animals transmissible to man and participate in disease detection and control.

At local levels veterinarians are active in state and municipal food inspection and disease control programs. They are the official representatives of the live-

gaged in the development and production of pharmaceuticals, vaccines, and antisera.

An increasing number of veterinarians are taking advantage of graduate study for advanced degrees offered by the several colleges of veterinary medicine and veterinary science departments of universities. On completion of these programs they devote their lives to teaching and research. Research opportunities embrace all of the fields of medical science with a growing demand and importance in the role of veterinarians in public institutions, individual organizations, and commercial concerns which support both fundamental and applied research.

## ADMISSION REQUIREMENTS AND SUGGESTED PREPARATION

1. The student must fulfill the general requirements for admission to the College of AFHE as listed in the General Information section of this bulletin. High school units as follows must be presented for admission: 3 units in English, 2 units in mathematics (elementary algebra and plane geometry), and 1 or more units in natural science or agriculture.

2. A student completing higher algebra and trigonometry in high school (in addition to elementary algebra and plane geometry) will not be required to repeat them in the preveterinary curriculum at the college level, unless his background proves insufficient to permit him to complete the requirements in mathematics.

3. Prospective students are encouraged to include biology, chemistry, and physics in their high school program.

4. It is desirable that prospective students have farm experience prior to entering the College of Veterinary Medicine.

English or rhetoric (communication) and public speaking—12 credits  
Chemistry—25 credits (general inorganic and qualitative, 12 credits; quantitative, 5 credits; and organic, 8 credits)  
Mathematics—must complete trigonometry and college algebra or their equivalent  
Biology—10 credits (general biology, zoology, or zoology and botany)  
Animal, poultry, and dairy husbandry—10 credits  
Physics—8 credits including laboratory  
Electives—14-18 credits. Not less than 14 of these credits must be in at least 3 of the following areas: agricultural economics, anthropology, economics, geography, history, humanities, literature, philosophy, political science, psychology, social science, and sociology. Credits in a foreign language may be substituted for 1 of the 3 required areas.

For those students registered in the preveterinary curriculum in the College of Agriculture, Forestry, and Home Economics, University of Minnesota, the following courses will satisfy the preveterinary course requirements for admission to the College of Veterinary Medicine:

### FIRST YEAR

AnHu 1—Introductory Animal Husbandry (4)  
DyHu 1—Elements of Dairying (3)  
PoHu 1—Poultry Production (3)  
InCh 4-5—General Inorganic Chemistry (10)  
InCh 11—Semimicro Qualitative Analysis (4)  
Math Y, T, 10—Higher Algebra; Trigonometry; College Algebra (13)  
Orie 1—College Orientation (1)  
Rhetoric—Freshman Communication requirement (9)

### SECOND YEAR

AnCh 57—Quantitative Analysis (4)  
MeAg 24, 25—College Physics I, II (8)  
O:Ch 61-62—Organic Chemistry (8)  
Rhet 22—Public Speaking (3)  
Biol 1-2—General Biology (10)  
Electives—14-18 credits (no specific courses are designated in the areas previously listed)

To receive consideration for admission to the College of Veterinary Medicine, the candidate should present an above-average scholastic record. For residents of Minnesota, a grade point average of 2.50 (C+) or better *based on the required*

*preveterinary courses* is used as a standard when evaluating a candidate for admission into the College of Veterinary Medicine. For a discussion of grades and determining grade point averages see the General Information section of this bulletin.

## PROFESSIONAL CURRICULUM ADMISSION INFORMATION

Enrollment in the professional curriculum of the College of Veterinary Medicine is limited. Admission requirements must be satisfied before or during the academic year in which the student

makes application. Application forms should be obtained from the Office of Admissions and Records at the beginning of the fall quarter of the second year of the preveterinary program.

For more detailed information concerning procedures leading to admission to the professional curriculum, criteria for selection, the facilities of the College of Veterinary Medicine, and the degrees offered by the College of Veterinary Medicine, consult the *Bulletin of the College of Veterinary Medicine* or correspond with the Dean, College of Veterinary Medicine, University of Minnesota, St. Paul 1.

## 9. Curriculums Relating to Agriculture, Offered Jointly with Other Colleges and in Which Students Register in Other Colleges

### AGRICULTURAL ENGI- NEERING

#### Professional 5-Year Curriculum

A professional curriculum in agricultural engineering is offered jointly with the Institute of Technology. Students register in the Institute of Technology. It has the same requirements in basic mathematics, mechanics, and physics as other engineering curriculums. It is a 5-year curriculum leading to the degree of bachelor of agricultural engineering.

This curriculum is designed to train students in the application of engineering principles to soil conservation, crop production and harvesting, crop storage and processing, livestock production, and farm living.

For further information consult the Department of Agricultural Engineering, St. Paul Campus. Course and curriculum details are given in the *Bulletin of the Institute of Technology*.

### AGRICULTURAL JOURNALISM

This curriculum is offered jointly by the College of Agriculture, Forestry, and Home Economics and the School of Journalism of the College of Science,

Literature, and the Arts. It is intended for those who wish to prepare for any branch of journalism that relates to agriculture, such as staff positions on agricultural magazines, editing country newspapers or special farm pages for newspapers, editing bulletins for state and federal departments of agriculture and for experiment stations, serving on public relations and promotion staffs, acting as farm service directors for radio and TV stations.

The student takes general courses in agricultural science, but the emphasis is upon preparation for technical journalism. Stress is laid also upon economic aspects of agriculture. A specialized sequence is available to students interested in advertising phases of agricultural journalism. See the *Bulletin of the College of Science, Literature, and the Arts* for further details.

Students majoring in agricultural journalism may register in the School of Journalism or the College of AFHE. Ordinarily they will transfer to the College of Science, Literature, and the Arts by the junior year. They must have their programs of agricultural subjects approved in the office of the director of resident instruction for the College of AFHE.

The curriculum requires 180 credits for graduation and leads to the degree of bachelor of arts. Courses required in the curriculum are listed as follows:

#### LOWER DIVISION

(Freshman, Sophomore)

- AgEc 1—Principles of Economics I (3)  
 AgEc 2—Principles of Economics II (3)  
 Rhet 1-2-3 (9) or Comm 1-2-3 (12) or Engl A-B-C (15) or Engl 1A-2A-3A (12)—Freshman English  
 Comp 27 or 28—Advanced Writing (3)  
 Hist 1-2-22 (or Hist 80-81)—American History (6)  
 Jour 13—Introduction to Journalistic Writing (4)  
 Jour 14-15—Newspaper Reporting (6)  
 Pol 1-2—American Government and Politics (6)  
 (or) Pol 5—American Government and Politics (5)  
 PubH 3—Personal Health (2)  
 (or) PubH 2—Personal and Public Health (2)  
 Soc 14—Rural Sociology (3)  
 Electives to meet College of SLA Lower Division group requirements in natural science, humanities, and foreign language  
 Electives in College of AFHE to total 15 credits in addition to AgEc 1-2 and Soc 14

#### UPPER DIVISION

(Junior, Senior)

- AgJo 53—Agricultural Publicity (3)  
 Jour 51—News Editing (3)  
 Jour 55—Typography (3)  
 Jour 71 or 73—Feature and Magazine Writing (3)  
 Jour 93—Community Newspaper (3)  
 Jour 95—Newspaper Management (3)  
 Jour 109—History of Journalism (3)  
 Jour 140-141—Interpretation of Contemporary Affairs (6)  
 9 credits from among the following:  
 Jour 60—Graphic Arts (3)  
 Jour 78—Public Relations Methods (3)  
 Jour 79—Advertising Copy Writing (3)  
 Jour 101—Reporting of Public Affairs (3)  
 Jour 113—Mass Communications Theory (3)  
 Jour 121—Mass Media in a Dynamic Society (3)  
 Jour 130—Public Opinion and Propaganda (3)  
 Jour 142—News Interpretation for Radio and Television (3)  
 Jour 161—Newspaper Advertising (3)  
 Minor—18 credits in an agricultural field of specialization or 9 credits in each of 2 fields  
 At least 6 credits of American History must be included among either Lower Division or Upper Division electives or group requirements

A suggested curriculum follows:

#### FRESHMAN YEAR

- Freshman Composition (9-15)  
 NSci 1-2-3 or Biol 1-2 (10)

- Pol 1-2 (6)  
 (or) Pol 5 (5)  
 PubH 3 or 2 (2)  
 Soc 14 (3)  
 Electives

#### SOPHOMORE YEAR

- AgEc 1 and 2 (6)  
 Comp 27 or 28 (3)  
 Hist 21-22 (6)  
 Jour 13 (4)  
 Jour 14-15 (6)  
 Electives, including 15 credits in agricultural and forestry subjects during freshman and sophomore years

#### JUNIOR YEAR

- Jour 51, 55, 71 or 73, 109, AgJo 53 (need not be taken in this order), plus journalism electives  
 Other electives for minor and outside fields

#### SENIOR YEAR

- Jour 93, 95, 140-141 (need not be taken in this order), plus journalism electives  
 Other electives for minor and outside fields

#### Suggested Electives

- Jour 18, 60, 78, 79, 101, 113, 121, 130, 142, 161  
 Agriculture or forestry:  
 AgEc 8, 12, 50, 82, 110, 131, 170  
 AgJo 53  
 Agro 1, 30  
 AnHu 1, 36, 37  
 DyHu 1, 11  
 Ent 1  
 For 1, 10, 136  
 Hort 1, 6, 10, 32, 60  
 PIPa 1  
 PoHu 1  
 Soil 1  
 Others:  
 Hist 1-2-3  
 Hum 1, 2, 3 or Rhet 41, 42, 43, 44  
 Pol 25  
 Psy 1-2, 4-5, 156  
 Soc 1, 2, 45, 53, 111, 156  
 SSci 1-2-3

#### Minor in Journalism

Students majoring in some field of the agricultural science curriculum may select a minor in journalism. The minor program must be approved by the School of Journalism or the office of the director of resident instruction, College of AFHE.

A minor in journalism should include Jour 11, 41, 71 or 73, and AgJo 53, and 6 additional credits selected from Jour 55, 78, 109, 121, and 130 or others.

## 10. Technical Certificate Program in Agriculture

The Technical Certificate Program in Agriculture is a terminal 60-credit program designed primarily for the student who plans on farming or who is interested in farm related activities. This program enables the student to secure a broad orientation to agriculture through the introductory courses in the various departments. In most instances the initial course in the department opens the way to registration in more advanced courses in these departments without additional prerequisites. While the prime objective of many of the students will be to terminate the program at the completion of 60 credits, many other students will use this as a means of exploring other professional opportunities.

These requirements will develop skills in communication and knowledge in sci-

ence, and permit freedom in selecting a major part of the total credit load from the various departments in agriculture.

Completion of Freshman Communications (9)  
 Rhet 22—Public Speaking (3)  
 Natural or biological science or mathematics (10)  
 Humanities and/or social science (6)  
 Orie 1—College Orientation Lectures (1)  
 PubH 3—Personal Health (2)  
 (or) PubH 2—Personal and Public Health (2)  
 Courses drawn from the various departments in agriculture (minimum 18)  
 Electives (to bring total to 60)  
 Cumulative grade point average of 2.00 (C average)

For a listing of courses in agriculture that are available without special prerequisites, refer to the introductory paragraphs of "A. Curriculums in Agriculture."

## B. CURRICULUMS IN FORESTRY

Forestry courses were given by the University of Minnesota as early as 1886, but professional work leading to the bachelor of science degree was not offered until 1903 when the present School of Forestry had its formal beginning. Since that time more than 1,700 foresters have been granted undergraduate and graduate degrees.

The bachelor of science degree is granted upon completion of 204 quarter credits of required and elective courses in the following curriculums or majors:

1. Forest Resources Management
2. Building-Materials Merchandising and Construction
3. Forest Products Engineering

Graduate work leading to the professional degree of master of forestry (M.F.) is offered in co-operation with the Graduate School to selected students holding the B.S. degree in forestry or its equivalent who wish to prepare themselves further for professional work in forestry.

Graduate work leading to the master of science (M.S.) and doctor of philosophy (Ph.D.) degrees is offered in co-operation with the Graduate School to those qualified students desiring to prepare themselves for research and teaching.

The School of Forestry is fully accredited by the Society of American Foresters, the national accrediting agency for United States forestry schools.

### FACILITIES

The School of Forestry possesses excellent facilities for training foresters. Located on the St. Paul Campus of the University and housed in two modern buildings, Green Hall and Forest Prod-

ucts Building, it draws on many departments on both the St. Paul and the Minneapolis campuses for instruction in courses basic to the training of foresters. Also housed in Green Hall are the Lake States Forest Experiment Station of the United States Forest Service, and a



campus, is available for field laboratory work during the regular school year. However, most of the field training for students specializing in these fields is concentrated at the Itasca Forestry and Biological Station and the Cloquet Forest Research Center.

The *Itasca Forestry and Biological Station* is located on Lake Itasca, the source of the Mississippi River, in Itasca State Park. It provides an excellent field laboratory for forest management majors. Here in a 6-week summer term, from about August 1 to September 15, students have an opportunity to study forest botany, soils, ecology, and measurements on a 30,000-acre tract of virgin and second-growth forest, including practically all forest types found in Minnesota. Good housing, dining hall, and laboratory facilities are available. Students operate their own commissary at cost.

The *Cloquet Forest Research Center* is located near the forest-products manufacturing center of Cloquet in northeastern Minnesota and comprises a tract of over 3,700 acres of virgin and second-growth timber. The entire spring quarter of the junior or senior year is spent at Cloquet. Training in all phases of field forestry, nursery operations, planting, thinning, preparation of management plans, utilization, forest surveys, recreation, wildlife and fish management, forest protection, forest engineering, and aerial photographic interpretation is included. Housing, dining hall facilities, and laboratories are available. Students operate their own commissary at the Cloquet Forest on the same basis as at Itasca.

Available in Green Hall and the Forest Products Building, for training students interested in employment in the forest-products industries and for building-products merchandising are several well-equipped laboratories: woodworking, wood chemistry, timber testing, and

training stations in the several wood-utilization fields.

## THE WORK OF FORESTERS

The work of foresters is diverse. Forest management graduates are concerned primarily with the scientific management and protection of the forest, wildlife, recreation, grazing, and water resources on the approximately one-third of the land area of the United States which is classified as forest land. The majority of these graduates works largely with the management of forest lands for production of timber crops. Until recently public forest land-managing agencies—federal, state, county, and municipal—employed most of the graduates in these fields. Within the past 15 years, however, there has been increasing employment of forestry school graduates by private owners of forest lands—lumber, pulp and paper, plywood, and other wood-processing companies.

Graduates trained in the several utilization fields—building material merchandising and forest products engineering—find employment in the development, production, and merchandising of forest products.

Brochures and leaflets describing employment opportunities for graduates of these curriculums are available from the School.

Prospective students interested in obtaining further information on the various fields of forestry employment, employment opportunities, salaries of graduate foresters, etc., are urged to obtain copies of *Handbook of Information on Entering Positions in Forestry* which may be obtained from the Society of American Foresters, 425 Mills Building, 17th and Pennsylvania Ave. N.W., Washington 6, D.C. (cost 15 cents); *Careers in Forestry*, United States Department of Agriculture Miscellaneous Publication No. 249, which may be obtained from the Government Printing Office, Wash-

ington, D.C. (free); and *Opportunities in the Forest Products Industries*, National Lumber Manufacturers Association, 1319 18th St. N.W., Washington 6, D.C. (free).

## GENERAL INFORMATION

The first 2 years of work in all forestry curriculums is devoted primarily to basic courses such as chemistry, biology, mathematics, rhetoric, geology, economics, sociology, government, and surveying. In addition to these basic courses common to most curriculums, usually one 3-credit professional forestry course per quarter is included. Because the first 2 years of basic work are somewhat similar in all curriculums, students may transfer between curriculums at the completion of their sophomore year with little loss of credit.

The 6-week Summer Session term at the Itasca Forestry and Biological Station at Itasca State Park is required of all forest resources management majors, including transfer students. This requirement must be completed prior to the junior year unless special permission for postponement is given.

The spring quarter of the junior or senior year for majors in forest resources management is spent at the Cloquet Forest Research Center and is required.

The growing complexity of the duties performed by foresters in the management of natural resources affecting practically every phase of our society, demands that they have knowledge and training in humanities and social sciences. This need is met through the College requirement of 9 credits in humanities and 15 credits in the social sciences.

Students registered in preforestry curriculums at junior colleges, teachers' colleges, and other schools should complete the basic course requirements included in the School of Forestry curriculums if they are to receive full credit on transfer for work completed. In addition, students registered in preforestry curriculums at other institutions should plan to transfer at least by the end of their second year if they expect to complete the professional course requirements of the School of Forestry in 2 years.

Preforestry students at other institutions may complete the 6-week Summer Session requirement at the Itasca Forestry and Biological Station at the end of their freshman year and return to their school for sophomore work if they choose. However, this Summer Session requirement should be completed by the junior year.

Students are encouraged to obtain practical experience in forestry or the forest-products industries during summer vacations. Although work experience is not required for graduation, students find that the possession of such experience is an excellent recommendation when seeking employment. The School of Forestry assists students in obtaining summer employment with such federal agencies as the United States Forest Service, various state agencies, and with private companies.

The College entrance requirements apply to high school graduates planning to register in forestry curriculums. Students must have had at least 2 units of mathematics, including elementary algebra and plane geometry. Students without higher algebra in high school may complete Math Y (5 credits) at the University and apply the credit earned as electives.

## CURRICULUMS AND REQUIREMENTS

Work leading to the bachelor of science degree on the completion of 4 years of satisfactory work is offered in the following curriculums:

1. **Forest Resources Management**—Preparation for technical work in forest management on public and private forest lands; for work in state and federal forest experiment stations; for work with soil conservation, extension, and farm-forestry organizations; and for timber procurement and logging.
2. **Building-Materials Merchandising and Construction**—Preparation for work in lumber-yard management, building-products merchandising, light construction, and production.
3. **Forest Products Engineering**—Preparation for technical work in the fields

of pulp and paper, wood preservation, plywood manufacture, wood seasoning, and other wood-processing industries.

During the first 2 years, the work in all forestry curriculums is similar and is devoted largely to a study of general courses. Required course work for the 4 years varies with curriculum (160-180 credits). In addition to completion of required courses, students must complete sufficient elective courses to make a total of at least 204 credits. A maximum of 7 credits of D quality work in forestry courses is permitted.

To complement their major in a forestry curriculum, students may complete one or more minors. Courses included in minors must be beyond those now required in a forestry curriculum. This permits an orderly development and use of a large portion of the elective credits so that the student may gain reasonable proficiency in added disciplines or areas of knowledge. Record of minor work completed will be indicated on the scholastic record. Any area of knowledge is open to the student, subject, of course, to scheduling requirements and the permission of advisers and departments concerned. The areas in which arrangements for minors have been completed are animal husbandry, botany, zoology, agronomy, plant pathology and agricultural botany, plant genetics, wildlife management, soils, entomology, geography, horticulture, geology, chemistry, chemical engineering, economics, agricultural economics, business administration, public administration, political science, sociology, industrial engineering, agricultural engineering, mathematics, statistics, education, journalism, and either of the other forestry curriculums. In some cases credit in associated fields may be applied toward the minor concerned. Students are encouraged to take minors because they provide a background in added subject matter areas and may enhance the students' vocational and educational opportunities.

Credit earned in ROTC can be applied toward graduation in the elective group.

The attention of all students is called to the College humanities and social science requirement (see Index).

### FEEES FOR FIELD TRAINING SESSIONS

(Not listed in *Bulletin of General Information*)

The following fees and expenses are paid during the field-training sessions at Cloquet and Itasca.

**Cloquet Session** (juniors or seniors in forestry curriculums—spring quarter):

Tuition:

Residents of Minnesota .....	\$ 71.00
Nonresidents .....	200.00
Health fee .....	12.00

In addition, \$10 is charged each student for the use of the dormitory and will be collected by the student treasurer and paid to the Cloquet Forest Research Center during the first week of the spring quarter. The Cloquet Corporation also pays to the Cloquet Forest Research Center 5 per cent of its gross commissary operating expenses for use of the dining hall facilities, breakage, etc.

**Itasca Forestry and Biological Station** (freshmen in forestry curriculum—starting on the Monday closest to August 1 and running for 6 weeks):

Tuition (prorated on basis of regular quarter tuition per quarter of 12 weeks):

Residents of Minnesota .....	\$35.50
Nonresidents .....	100.00
Health fee .....	6.00

In addition, \$16.50 is charged each student for cabin rental. The Freshman Corporation also pays 5 per cent of its gross commissary operating expenses for use of dining hall facilities, breakage, etc. These charges will be paid to the professor in charge of the forestry session.

## I. Forest Resources Management

### FRESHMAN YEAR

This curriculum is intended for students interested in forest land management for production of timber, other forest crops, wildlife, water, and recreation.

MeAg 3—Technical Drawing (3)  
 (or) MeAg 2—Technical Drawing Problems  
 (1) (students with less than 1 yr high school drawing must complete MeAg 3)  
 Biol 1-2—General Biology (10)  
 InCh 4-5—General Inorganic Chemistry (10)  
 Geol 1—General Geology (3)  
 (Geol A—General Geology Lab (2) is recommended as a concurrent elective)  
 Math T—Trigonometry (3)  
 Rhetoric—Freshman Communication requirement (9)  
 Orie 1—College Orientation Lectures (1)  
 PubH 3—Personal Health (2)  
 (or) PubH 2—Personal and Public Health (2)  
 For 1—Introduction to Forestry (1)  
 For 4—Dendrology (4)  
 Electives, social sciences, humanities (see Index for social science, humanities requirement)  
 Total required credits (46) (not including humanities, social science courses)

**Lake Itasca Forestry and Biological Station—Summer Session for Foresters (6 weeks)**—Required of all forest resource management majors. Must be completed prior to junior year. A cumulative grade point average of at least 1.75 at the end of the quarter preceding Itasca and Biol 2 or a course in botany are required for registration.

For 2—Important Forest Plants (2)  
 For 5—Forest Ecology (4)  
 For 6—Field Forest Measurements (2)  
 Soil 3A—Field Forest Soils (1)  
 Total required credits (9)

### SOPHOMORE YEAR

AgBi 1A—Introduction to Biochemistry (5)  
 AgEc 1—Principles of Economics I (3)  
 AgEc 2—Principles of Economics II (3)  
 Rhet 22—Public Speaking (3)  
 Math 10—College Algebra (5)  
 MeAg 24, 25—College Physics I, II (8)  
 For 7—Elements of Forest Measurements (3)  
 For 8—Timber Estimating and Forest Surveys (3)  
 Soil 3—Forest Soils (3)  
 For 47—Introduction to the Forest Economy (2)  
 Social sciences, humanities, electives  
 Total required credits (38) (including AgEc 1 and 2 but not other social science, humanities courses)

During the last quarter of the sophomore year students will be required to submit to their advisers a suggested program of work with the objective of accomplishing a co-ordinated area of study in the major and minor fields in accordance with the professional objectives of the student.

### JUNIOR YEAR

Rhet 51—Exposition (3)  
 For 59—Introduction to Forest Aerial Photogrammetry (3)  
 For 127—Introduction to Silviculture (3)  
 MeAg 42—Surveying (4)  
 Ent 64—Fishery and Wildlife Populations (3)  
 For 111—Application of Statistical Methods in Forestry (3)  
 (or) Biom 90—Statistics (3)  
 For 75-76—Wood Structure and Identification (4)  
 For 51—Logging (2)  
 For 123—Production and Marketing (4)  
 For 124—Forest Management (3)  
 Social sciences, humanities, electives  
 Total required credits (31) (not including social science, humanities courses)

**Cloquet Forest Research Center**—To attend the Cloquet spring session, students must meet the following requirements:

1. A grade point average of at least 2.00 at the end of the quarter preceding the Cloquet session.
  2. Completion of the Itasca summer session.
  3. Completion of the following courses: For 59, 124, 126, 127, MeAg 42, For 111 or Biom 90.
  4. Completion of Ent 64 or consent of instructor.
  5. Health certificate—A certificate of physical fitness must be obtained from the Health Service (St. Paul Campus) before the end of the winter quarter and turned in at the Office of Admissions and Records before registration will be completed.
- For 60—Forest Engineering (2)  
 For 61—Introduction to Forest Recreation (1)  
 For 62—Forest Policy (1)  
 Ent 67—Techniques of Wildlife Management  
 For 128—Silviculture (6)  
 For 133—Forest Management and Utilization (2)  
 For 134—Forest Inventory and Photographic Interpretation (3)  
 Total required credits (17)

**SENIOR YEAR**

Rhet 52—Technical Writing (3)  
 (or) Rhet 56—Discussion Methods (3)  
 (or) Rhet 54—Advanced Public Speaking (3)  
 (Students having a grade of C or better in Rhet 22 and Rhet 51 are required to complete only 3 credits of additional rhetoric to be selected from the courses listed. Students having a D in either Rhet 22 or Rhet 51 shall take 6 credits of the courses listed, selected in consultation with their adviser.)  
 PIPa 51—Forest Pathology (4)  
 For 55—Fire Protection (2)  
 Ent 56—Forest Entomology (4)

For 77—Forest Products (3)  
 For 104—Watershed and Range Management (4)  
 For 199—Senior Seminar (1)  
 Social sciences, humanities, electives  
 Total required credits (21) (not including humanities, social science courses)

Social sciences and humanities to meet the College requirement, and electives, preferably including one of the listed minors, sufficient to total 204 credits shall be completed for the degree.

## 2. Building-Materials Merchandising and Construction Curriculum

This curriculum is suggested for those who wish to enter the building products merchandising, sales, construction, and production fields. The curriculum consists of fundamental training in the sciences, mathematics, and communications followed by specialized training in forest products, business administration, and principles of building construction.

**FRESHMAN YEAR**

Biol 1-2—General Biology (10)  
 Rhetoric—Freshman Communication requirement (9)  
 Math T—Trigonometry (3)  
 For 1—Introduction to Forestry (1)  
 For 1A—Conservation of Natural Resources (3)  
 For 4—Dendrology (4)  
 Ori 1—College Orientation Lectures (1)  
 Social sciences, humanities (exclusive of economics) (18) (see Index for social science, humanities requirement)  
 Total required credits (49)

**SOPHOMORE YEAR**

InCh 4-5—General Inorganic Chemistry (10)  
 Math 10—College Algebra (5)  
 Rhet 22—Public Speaking (3)  
 Rhet 51—Exposition (3)  
 Econ 1-2—Principles of Economics (6) (AgEc 1-2 alternate)  
 BA 5—Statistics (4)  
 BA 24-25—Accounting (6)  
 MeAg 3—Technical Drawing (3) (EG 14 or Ind 7 alternate)  
 Ind 9—Building Construction Drafting (3)  
 MeAg 7—Farm Building Construction (3)  
 For 47—Introduction to the Forest Economy (2)  
 Total required credits (48)

During the last quarter of the sophomore year students will be required to

submit to their advisers a suggested program of work with the objective of accomplishing a co-ordinated area of study in the major and minor fields in accordance with the professional objectives of the student.

**JUNIOR YEAR**

AgBi 1A—Introduction to Biochemistry (5)  
 MeAg 24, 25—College Physics I, II (8) (Phys 1-1A-2-2A alternate)  
 BA 28—Business Law (3)  
 For 75-76—Wood Structure and Identification (4)  
 For 77—Forest Products (3)  
 For 78—Forest Products Quality Standards (2)  
 For 123—Production and Marketing (4)  
 PubH 2—Personal and Public Health (2)  
 (or) PubH 3—Personal Health (2)  
 Total required credits (31)

**SENIOR YEAR**

BA 146—Real Estate (3)  
 For 79—Strength of Wood Materials (3)  
 For 80—Timber Testing Laboratory (2)  
 For 81—Wood Drying (3)  
 For 82—Wood Preservation (3)  
 For 83—Wood Finishing (3)  
 For 85—Glued Wood Products (3)  
 For 86—Wood Fiber and Particle Products (3)  
 For 87—Building Materials Merchandising (3)  
 For 88—Building Cost Estimating (3)  
 For 176—Timber Engineering (4)  
 For 199—Senior Seminar (1)  
 Total required credits (34)

**ELECTIVES**

Sufficient electives should be completed, preferably in 1 or more of the minors listed above, to make a total of 204 credits.

### 3. Forest Products Engineering

This curriculum is planned for students with an interest in the design, development, technology, and manufacture of wood products.

#### FRESHMAN YEAR

Biol 1-2—General Biology (10)  
 InCh 4-5—General Inorganic Chemistry (10)  
 Math 7—Trigonometry (3)  
 Math 10—College Algebra (5)  
 Orie 1—College Orientation Lectures (1)  
 For 1—Introduction to Forestry (1)  
 For 1A—Conservation of Natural Resources (3)  
 For 4—Dendrology (4)  
 Rhetoric—Freshman Communication requirement (9)  
 MeAg 3—Technical Drawing (3) (Ind 7 or EG 14 alternate)  
 Total required credits (49)

#### SOPHOMORE YEAR

AnCh 57—Quantitative Analysis (4)  
 Math 40—Mathematical Analysis I (5)  
 Math 53-54—Mathematical Analysis II-III (10)  
 PlPa 51—Forest Pathology (4)  
 InCh 11—Semimicro Qualitative Analysis (4)  
 Rhet 22—Public Speaking (3)  
 PubH 2—Personal and Public Health (2)  
 Social science requirement (6) (see Index for social science requirement)  
 Humanities requirement (9) (see Index for humanities requirement)  
 Total required credits (48)

During the last quarter of the sophomore year, students will be required to submit to their advisers a suggested program of work with the objective of accomplishing a co-ordinated area of study in the major and minor fields in accordance with the professional objectives of the student.

#### JUNIOR YEAR

AgEc 1—Principles of Economics I (3)  
 AgEc 2—Principles of Economics II (3)  
 OrCh 61-62—Elementary Organic Chemistry (8)  
 MeAg 24, 25—College Physics I, II (8)  
 For 75-76—Wood Structure and Identification (4)  
 For 77—Forest Products (3)  
 For 178—Woody Tissue Microtechnique (4)  
 PlPa 114—Advanced Forest Pathology (3)  
 Social science requirement (3)  
 Total required credits (39)

#### SENIOR YEAR

AgBi 119—Physical Biochemistry (3)  
 AgBi 121—Advanced Carbohydrate Chemistry (2)

For 79—Strength of Wood Materials (3)  
 For 80—Timber Testing Laboratory (2)  
 For 81—Wood Drying (3)  
 For 82—Wood Preservation (3)  
 For 85—Glued Wood Products (3)  
 For 86—Wood Fiber and Particle Products (3)  
 For 175—Wood Pulp and Paper (3)  
 For 176—Timber Engineering (4)  
 For 177—Wood Chemistry (3)  
 Rhet 51—Exposition (3)  
 For 111—Application of Statistical Methods in Forestry (3)  
 For 199—Senior Seminar (1)  
 Total required credits (40)

#### ELECTIVES

It is recommended that a part of the remaining 28 elective credits be completed in 1 or more of the minors listed above.

#### GRADUATE STUDY IN FORESTRY

Graduate study leading to the master of science (M.S.), doctor of philosophy (Ph.D.), and the professional degree, master of forestry (M.F.), is offered through the Graduate School in co-operation with the School of Forestry.

#### Master of Science and Ph.D. Programs

Graduate study leading to these degrees is intended for qualified students interested primarily in training for research and teaching in the several recognized forestry specializations: silviculture, management economics, measurements, genetics, watershed management, recreation, merchandising, construction, and forest products engineering. Graduates interested in these programs should consult the *Bulletin of the Graduate School* for details, and requests for information and admission should be directed to the Graduate School, University of Minnesota, Minneapolis 14.

#### Master of Forestry Program

The master of forestry program is designed to meet the need for added professional study by qualified forestry school graduates primarily interested in

administrative and technical work in forest management.

Students registered for master of forestry work will fulfill the requirements listed under the master of science (Plan B) program of the Graduate School. Reading knowledge of a foreign language is not required for the master of forestry degree. Completion of an added 6 credits of course work is substituted

for the language requirement of the Masters' Plan B program.

Graduates of forestry schools interested in the master of forestry program should consult the *Bulletin of the Graduate School* (master of science—Plan B) for details of requirements and should make application for admission with the Graduate School, University of Minnesota, Minneapolis 14.

## C. CURRICULUMS IN HOME ECONOMICS

The School of Home Economics provides opportunities for the student to prepare for a variety of professions, such as teaching, dietetics, research, business, agricultural extension, and for homemaking.

The bachelor of science degree is granted upon satisfactory completion of 185 credits of required and elective course work in a chosen curriculum. The average student completes work for this degree in 4 years. Upon the completion of a fifth year, students in home economics education may obtain a master of education degree.

Graduate work in home economics leading to master of science (M.S.), master of arts (M.A.), and doctor of philosophy (Ph.D.) degrees is offered through the Graduate School.

### FACILITIES

The School of Home Economics has extensive facilities for the education of home economists in a large number of professional fields. Modern laboratories and classrooms provide opportunities for stimulating educational experiences. Students also have available to them offerings in other departments on the St. Paul and Minneapolis campuses. The metropolitan area of the Twin Cities provides rich resources which are frequently used to supplement University facilities.

Two home management houses, located at the edge of the St. Paul Campus, enable students to gain experience in the responsibilities of family living.

### OPPORTUNITIES AVAILABLE TO HOME ECONOMICS GRADUATES

A major in home economics has the advantage of combining education for professional employment with education for homemaking. Opportunities for positions are more numerous than qualified home economics graduates. Majors in home economics education can look to

high school or extension teaching. Dietitians and nutritionists are needed for hospitals and public service agencies. Food service management majors can serve as directors of food services in schools, dormitories, business establishments, tearooms, and restaurants. Students majoring in home economics in the various areas of home economics in business may find positions in merchandising; in work with firms specializing in interior decorating, clothing design, household equipment or foods; with utility companies in home service work; in magazine or newspaper writing; in advertising; in radio or TV work. Opportunities for women with advanced degrees include administrative work, college teaching, and research for educational, governmental, or industrial agencies. Thus, home economics offers inviting opportunities for capable students.

### FOUR-YEAR CURRICULUMS

#### 1. Dietetics and Food Service Management—

*Dietetics*—For students who wish to become dietitians in hospitals or nutri-

tionists in institutions or community agencies.

**Food Service Management**—For students who are interested in preparing for the management of food services in restaurants, schools, colleges, hospitals, and industry.

**2. Home Economics in Business**—There are a variety of opportunities for positions through the business curriculums:

**Food in Business**—Provides training for those who desire positions in business organizations in the food field such as manufacturers and processors of food products, food trade and growers associations, and utility companies.

**Related Art in Business**—For positions in interior design such as home or office decorating and consulting on home planning or lighting; and costume design such as fashion co-ordinating and merchandising.

**Textiles and Clothing in Business**—For positions in textile testing in business or government laboratories; clothing design in the garment manufacturing industry; and merchandising, such as buying or fashion co-ordinating in retail stores.

**Household Equipment in Business**—The general home economics curriculum is suggested with electives in household equipment and related areas to prepare for such positions as home economists with appliance manufacturers in testing new equipment and/or in consumer relations.

**3. Home Economics with Journalism Minor**—For students interested in positions on magazines and newspapers or with business firms in the preparation of educational materials.

#### 4. Home Economics Education—

**Home Economics Teaching**—Offered jointly with the College of Education for those who wish to obtain a vocational certificate which permits them to teach in high school programs, including those reimbursed from federal and state funds.

**Home Economics Extension**—Offered jointly with the College of Education for students interested in preparation for positions in the Agricultural Extension Service, such as home agent, 4-H Club agent, or home economics specialist.

**5. Home Economics and Nursery School Education**—Offered jointly with the Institute of Child Development for selected individuals who wish to work in nursery schools.

**6. Preparation for Research** in (a) experimental foods, (b) nutrition, and (c) textiles and clothing. For students who plan a research career in home economics. This curriculum prepares for graduate work as a basis for more intensive specialization in fields of home economics research. Students should have a superior high school record or a college freshman record considerably above the average to enter this curriculum.

**7. General Home Economics**—For students who are primarily interested in a broad general education in preparation for homemaking or who wish to plan a specialized program for which there is no defined curriculum.

## FIVE-YEAR CURRICULUM

This is a joint curriculum between the College of Education and the College of AFHE leading to the degree of master of education. This curriculum will qualify a person for high school teaching and for some college positions. For detailed statement, see the *Bulletin of the College of Education*.

## GENERAL INFORMATION

Each student entering the School of Home Economics works with a faculty adviser who explains the requirements of the curriculum in which the student is interested and the opportunities provided by the University for counseling, orientation, and general education. The student plans her program with the help of the adviser.

Before the junior year the student decides upon the field in which she wishes



to specialize and files a specialization form in the Office of Admissions and Records. This form must be approved and signed by the student's adviser and the chairman of the division in which the student expects to major.

Specialization in any of the fields of home economics involves two types of preparation for each student: (a) the courses required to prepare for professional employment and (b) a core of courses to prepare for homemaking.

All students are expected to meet the all-College requirements.

HE 86, Home Management Laboratory, is required of all women students majoring in home economics. A \$10 deposit payable at the home economics office is required the quarter preceding residence in the house.

New opportunities for persons with home economics training are opening up so that careful attention should be given to the choice of electives. Home economists are needed with more preparation in economics, accounting, statistics, psychology, science, and sociology than is required in the curriculums listed. Inter-

ested students should consult their advisers to find the fields where such background is needed. Electives of general interest, or those which seem particularly suitable for the major sequence, should be chosen to complete the student's program.

The School of Home Economics will give assistance, whenever possible, to graduates in obtaining placement in hospital internships, teaching and business positions.

The prospective transfer student should study the course requirements as given for the curriculum in which she is especially interested and should plan her courses in the Lower Division in so far as possible to be equivalent to those in the freshman and sophomore years at the University.

Transfer credit may be applied on required courses for English; physical, biological, and social sciences; humanities; and certain home economics courses. Courses in other areas and work beyond the requirements may be given elective credit upon recommendation of the Office of Admissions and Records.

## 1. Dietetics and Food Service Management

These curriculums are planned to provide background and initial experience for those men and women who are interested in the organization and management of food services in hospitals, schools, colleges, restaurants, similar institutions and industry. It meets the academic requirements of the American Dietetic Association and qualifies the graduate for an administrative, food clinic, or hospital internship. Students completing either of these curriculums will find opportunities for employment in a hospital as administrative or therapeutic dietitian, as a nutritionist in a public health agency, as a dietitian in a food clinic, or as a food service manager in a college dormitory, hotel, restaurant, school, or industrial cafeteria.

It is recommended that each student who wishes to secure a position of responsibility use vacation periods to get

well-rounded work experience. Such experience may be gained by securing minor administrative positions in a food service of his or her choice.

Courses required in each curriculum are listed below. A grade of at least C is required in the following courses: HE 40, 41, 63, 64, 65, 170. Also a C average is required for the following group of courses: HE 33, 79, 171, and 173. Students must meet the all-College requirements in humanities and social sciences (see Index).

### DIETETICS

#### FRESHMAN YEAR

- Orie 1—College Orientation Lectures (1)
- HE 1—Choice and Care of Clothing (3)
- HE 10—Introduction to Home Economics (1)
- HE 17—Personal and Family Living (3)
- HE 20—Introduction to Related Art (3)

HE 31—Introduction to Nutrition (3)  
 HE 40—Food Preparation (5)  
 Rhetoric—Freshman Communication requirement (9)  
 Biol 1A-2A—General Biology (7)  
 InCh 4-5—General Inorganic Chemistry (10)  
 Phsl 4—Human Physiology (4)  
 MeAg 35—Household Physics (5)  
 PubH 2—Personal and Public Health (2)  
 (or) PubH 50 (see jr-sr list)  
 Soc 1A or Soc 1—Man in Modern Society (3)  
 Physical education (3) (may be completed any time during 4 yrs)

### SOPHOMORE YEAR

HE 24—Problems in Home Planning and Furnishing (5)  
 HE 33—Nutrition I (4)  
 HE 35—Nutrition II (4)  
 HE 41—Food Management and Marketing (5)  
 HE 49—Household Equipment (3)  
 HE 63—Quantity Food Purchasing and Production (5) (open to HE students registered in AFHE)  
 Rhet 22—Public Speaking (3)  
 MicB 53—General Bacteriology (5)  
 OrCh 41-42—Elementary Organic Chemistry (8)  
 (or) AgBi 1A—Introduction to Biochemistry (5)  
 AgEc 1—Principles of Economics I (3)  
 AgEc 2—Principles of Economics II (3)  
 AgEc 25—Principles of Accounting (4)  
 (or) BA 24-25—Principles of Accounting (6)  
 Psy 1-2—General Psychology (6)

### JUNIOR-SENIOR YEARS

PubH 52—Home Nursing and Family Care (1)  
 PubH 50—Personal and Community Health (3)  
 (or) PubH 2 (see fr list)  
 HE 50—Textiles (4)  
 HE 64—Food Service Equipment (4)  
 HE 65—Food Service Organization and Management (3)  
 HE 66—Administrative Food Service Experience (5)  
 HE 79—Selected Problems for Dietitians (3)  
 HE 85—Home Management Principles (3)  
 HE 86—Home Management Laboratory (4)  
 HE 142—Experimental Cookery (3)  
 HE 170—Nutrition Principles (3)  
 HE 171—Maternal and Child Nutrition (3)  
 HE 173—Diet Therapy (4)  
 HE 174—Nutrition Topics (1)  
 HE 176—Advanced Nutrition (4)  
 (or) HE 177—Digestion and Metabolism (3)  
 HE 178—Clinical Problems in Nutrition (2)  
 Rhet 51—Exposition (3)  
 HEEd 90—Child Development (3)  
 Recommended as electives any of the following courses:  
 AgEc 126—Economics of Consumption (3)  
 AnCh 57—Quantitative Analysis (4)  
 AnHu 30—Meat Utilization and Selection (3)  
 PubH 75—Environmental Sanitation I (3)

## FOOD SERVICE MANAGEMENT

### FRESHMAN YEAR

Orie 1—College Orientation Lectures (1)  
 HE 1—Choice and Care of Clothing (3)  
 HE 10—Introduction to Home Economics (1)  
 HE 17—Personal and Family Living (3)  
 HE 20—Introduction to Related Art (3)  
 HE 31—Introduction to Nutrition (3)  
 HE 40—Food Preparation (5)  
 PubH 2—Personal and Public Health (2)  
 (or) PubH 50 (see jr-sr list)  
 Rhetoric—Freshman Communication requirement (9)  
 InCh 4-5—General Inorganic Chemistry (10)  
 MeAg 35—Household Physics (5)  
 Soc 1A or 1—Man in Modern Society (3)  
 Physical Education (3) (may be taken any time during 4 yrs)  
 Biol 1A-2A—General Biology (7)  
 Phsl 4—Human Physiology (4)  
 DInd 20—Household Microbiology (4)  
 (or) MicB 53

### SOPHOMORE YEAR

HE 24—Problems in Home Planning and Furnishing (5)  
 HE 41—Food Management and Marketing (5)  
 HE 49—Household Equipment (3)  
 Rhet 22—Public Speaking (3)  
 AgBi 1A—Introduction to Biochemistry (5)  
 AgEc 1—Principles of Economics I (3)  
 AgEc 2—Principles of Economics II (3)  
 AgEc 25—Principles of Accounting (4)  
 (or) BA 24-25—Principles of Accounting (6)  
 Soc 2—The American Community (3)  
 (or) Soc 14—Rural Sociology (3)  
 Psy 1-2—General Psychology (6)

### JUNIOR-SENIOR YEARS

PubH 52—Home Nursing and Family Care (1)  
 PubH 50—Personal and Community Health (3)  
 (or) PubH 2 (see fr list)  
 HE 50—Textiles (4)  
 HE 63—Quantity Food Purchasing and Production (5) (open to HE students registered in AFHE)  
 HE 64—Food Service Equipment (4)  
 HE 65—Food Service Organization and Management (3)  
 HE 66—Administrative Food Service Experience (5)  
 HE 70—Advanced Food Preparation (3)  
 HE 85—Home Management Principles (3)  
 HE 86—Home Management Laboratory (4)  
 HE 142—Experimental Cookery (3)  
 HE 170—Nutrition Principles (3)  
 HE 171—Maternal and Child Nutrition (3)  
 HE 173—Diet Therapy (4)  
 HEEd 90—Child Development (3)  
 Rhet 51—Exposition (3)  
 PubH 75—Environmental Sanitation (3)  
 AgEc 126—Economics of Consumption (3)  
 (or) Econ 120—Economics of Consumption (3)  
 AgEc 40—Principles of Marketing Organization (3)

(or) BA 57—Principles of Marketing (3)  
 AnHu 30—Meat Selection and Utilization (3)  
 One of the following:

- BA 52—Modern Industrial Relations: Labor Marketing (3)
- BA 50—Production Management (3)

- Psy 160—Psychology in Personnel Work (3)
- (or) Psy 156—Psychology of Advertising (3)
- Recommended electives:
- HE 146—Special Food Problems (3)
- HE 79—Selected Problems for Dietitians (3)

## 2. Home Economics in Business

Students planning to use home economics training in business may choose one of the following fields in which to specialize.

### FOODS

This curriculum is planned to give students background for a variety of positions in the foods field. Responsibilities of home economists in such positions include helping in the development of new products; preparing consumer service material, such as recipe folders, booklets, and directions on packages; checking advertising copy for accuracy and content; preparing and posing food for photography; giving talks and demonstrations; handling consumer and professional correspondence; supplying material and checking scripts for radio and television.

The courses required in the curriculum are listed below. For this specialization a grade of at least C is required for the following courses: HE 40, 41, 142, 170, Rhet 22.

Students must meet the all-College requirements for graduation.

### FRESHMAN-SOPHOMORE YEARS

- Oric 1—College Orientation Lectures (1)
- Rhetoric—Freshman Communication requirement (9)
- HE 1—Choice and Care of Clothing (3)
- HE 10—Introduction to Home Economics (1)
- HE 17—Personal and Family Living (3)
- HE 20—Introduction to Related Art (3)
- HE 31—Introduction to Nutrition (3)
- HE 40—Food Preparation (5)
- Biol 1A-2A—General Biology (7)
- Phsl 4—Human Physiology (4)
- InCh 4-5—General Inorganic Chemistry (10)
- PubH 2—Personal and Public Health (2)
- (or) PubH 50 (see jr-sr list)
- MeAg 35—Household Physics (5) (students with 1 yr high school physics may be exempt from this requirement)
- Soc 1A or 1—Man in Modern Society (3)
- AgBi 1A—Introduction to Biochemistry (5)

- (or) OrCh 41, 42—Elementary Organic Chemistry (8)
- AgEc 1—Principles of Economics I (3)
- AgEc 2—Principles of Economics II (3)
- Physical education (3) (may be completed at any time during 4 yrs)
- 6 credits from literature, humanities, music, art, philosophy, theater arts (except studio or technical courses)
- HE 24—Problems in Home Planning and Furnishing (5)
- HE 41—Food Management and Marketing (5)
- HE 49—Household Equipment (3)
- Psy 1-2—General Psychology (6)
- Rhet 22—Public Speaking (3)
- MicB 53—General Bacteriology (5)
- Jour 11—Reporting for Nonmajors (3)
- Jour 18—Principles of Advertising (3)
- (or) BA 77 (see jr-sr list)

### JUNIOR-SENIOR YEARS

- PubH 52—Home Nursing and Family Care (1)
- PubH 50—Personal and Community Health (3)
- (or) PubH 2 (see fr-soph list)
- HE 50—Textiles (4)
- HE 70—Advanced Food Preparation (3)
- HE 71—Demonstrations (1)
- HE 85—Home Management Principles (3)
- HE 86—Home Management Laboratory (4)
- HE 88—Introduction to Food Quality Evaluation (3)
- HE 120—Art History (3)
- HE 140—New Developments in Food Preparation (3)
- HE 141—Current Literature in Foods (3)
- HE 142—Experimental Cookery (3)
- HE 146—Special Food Problems (3)
- HE 170—Nutrition Principles (3)
- HE 171—Maternal and Child Nutrition (3)
- HE 174—Nutrition Topics (1)
- HEEd 90—Child Development (3)
- Psy 156—Psychology of Advertising (3)
- BA 77—Advertising (3)
- (or) Jour 18 (see fr-soph list)
- Rhet 51—Exposition (3)
- At least 8 credits from the following:
- GC 26A—Photography (3)
- Jour 41—Publications Editing (3)
- Jour 73—Magazine Writing (3)
- AnHu 30—Meat Selection and Utilization (3)
- Rhet 54—Advanced Public Speaking (3)
- HE 63—Quantity Food Purchasing and Production (5)
- AgBi 3—Introduction to Biochemistry (3)
- AnCh 57—Quantitative Analysis (4)
- HE 33—Nutrition I (4)
- AgEc 126—Economics of Consumption (3)

## RELATED ART

The curriculum in related art is planned to give students a background in the applications of color and design leading primarily to work in department stores, interior design studios, utility companies, dress and specialty shops. There are two fields of specialization within the related art curriculum: interior design and costume design. However, a student may combine the two specializations. The related art curriculum may be the basis for graduate study preparatory to college teaching.

For those students interested in merchandising, it is highly desirable to have practical retailing experience before graduation. In all these fields of business a knowledge of typing is helpful.

A grade of at least C is required for all related art courses. Students must meet the all-College requirements for graduation.

### FRESHMAN-SOPHOMORE YEARS

- Orie 1—College Orientation Lectures (1)
- HE 1—Choice and Care of Clothing (3)
- HE 10—Introduction to Home Economics (1)
- HE 17—Personal and Family Living (3)
- HE 20—Introduction to Related Art (3)
- HE 21—Color and Design (3)
- HE 22—Beginning Costume Design (3)
- HE 23—Design Problems (3)
- HE 24—Problems in Home Planning and Furnishing (5)
- HE 25—Design Applied to Crafts (3)
- HE 31—Introduction to Nutrition (3)
- HE 40—Food Preparation (5)
- HE 41—Food Management and Marketing (5)
- HE 49—Household Equipment (3)
- Rhetoric—Freshman Communication requirement (9)
- Rhet 22—Public Speaking (3)
- 8-10 credits from Group I or II:
  - Group I—Hum 1, 2 or 1, 4 or 21, 22, 23 or 3 courses from Rhet 41, 42, 43, 44 (humanities)
  - Group II—Philosophy (any Lower Division course); literature (StP or Mpls Campus); Mus 10; Spch 31 (theater)
- One of the following:
  - Comp 27—Advanced Writing (3)
  - Rhet 26—Original Writing (3)
  - Jour 11—Reporting for Nonmajors (3)
- Take Group I or II
  - Group I—NSci 1-2-3—Orientation in the Natural Sciences (15)
  - Group II—Biol 1A-2A—General Biology (7)
- InCh 4-5—General Inorganic Chemistry (10)

- MeAg 35—Household Physics (5)  
(those with 1 yr high school physics may be exempt from this requirement)
- PubH 2—Personal and Public Health (2)  
(or) PubH 50 (see jr-sr list)
- Take Group I or II:
  - Group I—Soc 1 or Soc 1A—Man in Modern Society (3); Hist 1-2—Civilization of the Modern World (6)
  - Group II—SSci 1-2-3—Introduction to Social Science (12)
- AgEc 1—Principles of Economics I (3) and AgEc 2—Principles of Economics II (3)  
(or) Econ 1-2—Principles of Economics (6)
- Psy 1-2—General Psychology (6)
- Jour 18—Principles of Advertising (3)  
(or) Psy 156 (see jr-sr list)
- Art 1—Principles of Art (5)
- Art 20—Drawing (2)  
(or) Art 23—Drawing, Design I (3)
- Physical education (3) (may be completed any time during 4 yrs)

### JUNIOR-SENIOR YEARS

- HE 50—Textiles (4)
- HE 53—Supervised Retail Training (4)  
(or) BA 107—Retail Management (3) (with consent of adviser)
- HE 76—Nutrition of the Family (4)
- HE 85—Home Management Principles (3)
- HE 86—Home Management Laboratory (4)
- HE 120—Art History (3)
- HE 121—Textile Design (3)
- HEED 90—Child Development (3)
- Rhet 51—Exposition (3)
- AgEc 126—Economics of Consumption (3)  
(or) Econ 120—Economics of Consumption (3)
- Psy 156—Psychology of Advertising (3)  
(or) Jour 18 (see fr-soph list)
- PubH 52—Home Nursing and Family Care (1)
- PubH 50—Personal and Community Health (3)  
(or) PubH 2 (see fr-soph list)

### Interior Design Specialization

To the courses required for all related art majors add the following:

- HE 28—Construction, Refinishing of Home Furnishings (3)
- HE 122A—Rendering Techniques for Interiors (3)
- HE 122B—Advanced Interior Design (3)
- HE 123—History of Home Furnishings (2)
- HE 127—Purchasing Home Furnishings (3)
- HE 180—Advanced Home Planning and Furnishings (3)

### Costume Design Specialization

To the courses required for all related art majors add the following:

- HE 3-4—Clothing Construction A and B (6)
- HE 53—Advanced Clothing (3)
- HE 115—Economic and Social Aspects of Clothing (3)  
(or) HE 116—Family Clothing Problems (3)

- HE 125—Advanced Costume Design (3)  
HE 128—History of Costume (2)

## TEXTILES AND CLOTHING

The textiles and clothing in business curriculum is designed to provide students specializing in this area with fundamental knowledge concerning textiles, textile products, garment construction, and business procedures as background for positions in the production, testing, or merchandising of textiles and clothing. This curriculum may also be the basis for graduate study preparatory to teaching textiles and clothing at the college level.

For students specializing in textiles and clothing in business, experience in retail selling before graduation is desirable.

Students selecting the textiles and clothing in business curriculum must complete the courses listed under freshman-sophomore, junior-senior years and under A or B. For this specialization a grade of at least C is required in the following courses: HE 3, 4, 21, 22, 50, 102, 107, 115. Students must meet the all-College requirements for graduation (see Index).

### FRESHMAN-SOPHOMORE YEARS

- Orie 1—College Orientation Lectures (1)  
HE 1—Choice and Care of Clothing (3)  
HE 3—Clothing Construction A (3)  
HE 4—Clothing Construction B (3)  
HE 10—Introduction to Home Economics (1)  
HE 17—Personal and Family Living (3)  
HE 20—Introduction to Related Art (3)  
HE 21—Color and Design (3)  
HE 22—Beginning Costume Design (3)  
HE 24—Problems in Home Planning and Furnishing (5)  
HE 31—Introduction to Nutrition (3)  
HE 40—Food Preparation (3)  
HE 41—Food Management and Marketing (5)  
HE 49—Household Equipment (3)  
Rhetoric—Freshman Communication requirement (9)  
Rhet 22—Public Speaking (3)  
6 credits from the following humanities areas: humanities, literature, philosophy, music, theater arts or non-studio courses in art  
Soc IA or I—Man in Modern Society (3)  
AgEc 1—Principles of Economics I (3) and

- AgEc 2—Principles of Economics II (3)  
(or) Econ 1-2—Principles of Economics (6)  
Psy 1-2—General Psychology (6)  
MeAg 35—Household Physics (5)  
Biol 1A-2A—General Biology (7)  
DInd 20—Household Microbiology (4)  
(or) MicB 53 (see jr-sr list)  
PubH 2—Personal and Public Health (2)  
(or) PubH 50 (see jr-sr list)  
Physical education (3) (may be taken any time during 4 yrs)

### JUNIOR-SENIOR YEARS

- HE 50—Textiles (4)  
HE 76—Nutrition of the Family (4)  
(or) HE 170—Nutrition Principles (3) and  
HE 171—Maternal and Child Nutrition (3)  
HE 85—Home Management Principles (3)  
HE 86—Home Management Laboratory (4)  
HE 102—Advanced Textiles (3)  
HE 115—Economic and Social Aspects of Clothing (3)  
HE 120—Art History (3)  
HE 127—Purchasing Home Furnishings (3)  
HEED 90—Child Development (3)  
Rhet 51—Exposition (3)  
AgEc 126—Economics of Consumption (3)  
BA 57—Principles of Marketing (3)  
BA 107—Retail Management I (3)  
(or) HE 58—Supervised Retail Training (4)  
MicB 53—General Bacteriology (5)  
(or) DInd 20 (see fr-soph list)  
Psy 156—Psychology of Advertising (3)  
PubH 52—Home Nursing and Family Care (1)  
PubH 50—Personal and Community Health (3)  
(or) PubH 2 (see fr-soph list)

### A. Store and Other Commercial Enterprises

- HE 53—Advanced Clothing (3)  
Fren 1—Beginning French (5) (or 1 yr high school French)  
InCh 4-5—General Inorganic Chemistry (10)  
(or) GC 7C—Physical Science: Chemistry (5)  
AgBi 1A—Introduction to Biochemistry (5)  
AgEc 25—Principles of Accounting (4)  
(or) BA 24—Principles of Accounting (3)  
BA 77—Advertising (3)

### B. Textiles Testing

- HE 107—Textile Analysis (3)  
InCh 4-5—General Inorganic Chemistry (10)  
InCh 11—Semimicro Qualitative Analysis (4)  
(or) InCh 26—Introduction to Chemical Principles (5)  
OrCh 41-42—Elementary Organic Chemistry (8)  
AnCh 57—Quantitative Analysis (4)  
Math Y—Higher Algebra (3 or 5)  
Math 10—College Algebra (5)  
Biom 90—Introductory Statistics (3)

### 3. Home Economics with Journalism Minor

Students planning to use home economics training in positions which also require some training in journalism may choose one of the following fields in which to specialize. The courses listed in each of these fields constitute, in effect, a major in home economics and a minor in journalism.

#### FOODS MAJOR, JOURNALISM MINOR

This curriculum is designed for foods major students who are interested in obtaining positions which require an introductory knowledge of journalistic problems and practices. Such positions are common in industry-supported institutes, food processing companies and equipment manufacturing firms in which home economists with some journalistic background are employed, and to some extent in advertising agencies, magazines, newspapers, and trade journals.

Students must meet the all-College requirements for graduation (see Index).

#### FRESHMAN-SOPHOMORE YEARS

- Orie 1—College Orientation Lectures (1)
- Rhetoric—Freshman Communication requirement (9)
- HE 1—Choice and Care of Clothing (3)
- HE 10—Introduction to Home Economics (1)
- HE 17—Personal and Family Living (3)
- HE 20—Introduction to Related Art (3)
- HE 31—Introduction to Nutrition (3)
- HE 40—Food Preparation (5)
- Biol 1A-2A—General Biology (7)
- Phsl 4—Human Physiology (4)
- InCh 4-5—General Inorganic Chemistry (10)
- PubH 2—Personal and Public Health (2)
- (or) PubH 50 (see jr-sr list)
- MeAg 35—Household Physics (5) (students with 1 yr high school physics may be exempt from this requirement)
- Soc 1A or 1—Man in Modern Society (3)
- GC 26A—Photography (3)
- (or) Art 10—Photography (3)
- (or) AnHu 30—Meat Selection and Utilization (3)
- (or) HE 89 (see jr-sr list)
- Physical education (3) (may be completed at any time during 4 yrs)
- 6 credits from literature, humanities, music, art, philosophy, theater arts (except studio or technical courses)
- HE 24—Problems in Home Planning and Furnishing (5)
- HE 41—Food Management and Marketing (5)
- HE 49—Household Equipment (3)

- Psy 1-2—General Psychology (6)
- Rhet 22—Public Speaking (3)
- AgBi 1A—Introduction to Biochemistry (5)
- AgEc 1—Principles of Economics I (3)
- AgEc 2—Principles of Economics II (6)
- MicB 53—General Bacteriology (5)
- Comp 27 or 28—Advanced Writing (3)
- Jour 11—Reporting for Nonmajors (3)
- Jour 18—Principles of Advertising (3)
- Jour 41—Publications Editing (3)

#### JUNIOR-SENIOR YEARS

- PubH 52—Home Nursing and Family Care (1)
- PubH 50—Personal and Community Health (3)
- (or) PubH 2 (see fr-soph list)
- HE 50—Textiles (4)
- HE 70—Advanced Food Preparation (3)
- HE 71—Demonstrations (1)
- HE 85—Home Management Principles (3)
- HE 86—Home Management Laboratory (4)
- HE 88—Introduction to Food Quality Evaluation (3)
- HE 89—Special Problems in Household Equipment (3)
- (or) GC 26A
- (or) Art 10
- (or) AnHu 30 (see fr-soph list)
- HE 120—Art History (3)
- HE 140—New Developments in Food Preparation (3)
- HE 141—Current Literature in Foods (3)
- HE 142—Experimental Cookery (3)
- HE 146—Special Food Problems (3)
- HE 170—Nutrition Principles (3)
- HE 171—Maternal and Child Nutrition (3)
- HEEd 90—Child Development (3)
- Psy 156—Psychology of Advertising (3)
- Rhet 51—Exposition (3)
- Jour 55—Newspaper Make-up and Typography (3)
- (or) Jour 60—Graphic Arts: Processes (3)
- Jour 73—Magazine Writing (3)
- (or) Jour 71—Business News, Feature Writing (3)
- Jour 53—Picture Editing (3)
- (or) Jour 74—Magazine Editing (3)
- (or) Jour 79—Advertising Copy Writing (3)
- (or) Jour 90—Mass Communications and the News (3)

#### RELATED ART MAJOR, JOURNALISM MINOR

The following curriculum in related art and journalism is designed for students who wish to do writing in the areas of home furnishings, house planning, crafts, costume design, and general fashion. Positions are available with magazines and newspapers as well as with manufacturers and retailers who issue educational and promotional materials. The ability to use a typewriter is important.

**FRESHMAN-SOPHOMORE YEARS**

- Orie 1—College Orientation Lectures (1)  
 HE 1—Choice and Care of Clothing (3)  
 HE 10—Introduction to Home Economics (1)  
 HE 17—Personal and Family Living (3)  
 HE 20—Introduction to Related Art (3)  
 HE 21—Color and Design (3)  
 HE 22—Beginning Costume Design (3)  
 HE 23—Design Problems (3)  
 HE 24—Problems in Home Planning and Furnishing (5)  
 HE 25—Design Applied to Crafts (3)  
 HE 31—Introduction to Nutrition (3)  
 HE 40—Food Preparation (5)  
 HE 41—Food Management and Marketing (5)  
 HE 49—Household Equipment (3)  
 Rhetoric—Freshman Communication requirement (9)  
 Rhet 22—Public Speaking (3)  
 One of the following:  
 Rhet 31—Poetry and Drama (3)  
 Rhet 32—Novel and Short Story (3)  
 Rhet 33—American Life in American Literature (3)  
 Rhet 60 (see jr-sr list)  
 Take 8-10 credits from Group I or II:  
 Group I—Hum 1, 2 or 1, 4 or 21, 22, 23 or 3 courses from Rhet 41, 42, 43, 44 (humanities)  
 Group II—Philosophy (any Lower Division course); literature (SIP or Mpls Campus) Mus 10; Spch 31 (theater)  
 Comp 27 or 28—Advanced Writing (3)  
 Take Group I or II:  
 Group I—NSci 1-2-3—Orientation in the Natural Sciences (15)  
 Group II—Biol 1A-2A—General Biology (7)  
 InCh 4-5—General Inorganic Chemistry (10)  
 PubH 2—Personal and Public Health (2)  
 (or) PubH 50 (see jr-sr list)  
 MeAg 35—Household Physics (5) (those with 1 yr high school physics may be exempt from this requirement)  
 Take Group I or II:  
 Group I—Soc 1 or 1A—Man in Modern Society (3); Hist 1-2—Civilization of Modern World (6)  
 Group II—SSci 1-2-3 (12)  
 Physical education (3) (may be completed any time during 4 yrs)  
 Art 1—Principles of Art (5)  
 GC 26A—Photography (3)  
 (or) Art 10—Photography (3)  
 Jour 11—Reporting for Nonmajors (3)  
 Jour 41—Publications Editing (3)  
 Jour 18—Principles of Advertising (3)  
 (or) Psy 156 (3) (see jr-sr list)  
 AgEc 1—Principles of Economics I (3) and AgEc 2—Principles of Economics II (3)  
 (or) Econ 1-2—Principles of Economics (6)  
 Psy 1-2—General Psychology (6)

**JUNIOR-SENIOR YEARS**

- HE 50—Textiles (4)  
 HE 58—Supervised Retail Training (4)  
 (or) BA 107—Retail Store Management (3)  
 (with consent of adviser)

- HE 76—Nutrition of the Family (4)  
 HE 85—Home Management Principles (3)  
 HE 86—Home Management Laboratory (4)  
 HE 115—Economic and Social Aspects of Clothing (3)  
 (or) HE 116—Family Clothing Problems (3)  
 HE 120—Art History (3)  
 HE 121—Textile Design (3)  
 HE 123—History of Home Furnishings (2)  
 HE 127—Purchasing Home Furnishings (3)  
 HE 180—Advanced Home Planning and Furnishing (3)  
 Rhet 51—Exposition (3)  
 Rhet 60—Contemporary Life and Literature (3)  
 (or) Rhet 31, 32, 33 (see fr-soph list)  
 AgEc 126—Economics of Consumption (3)  
 (or) Econ 120—Economics of Consumption (3)  
 Psy 156—Psychology of Advertising (3)  
 (or) Jour 18 (see fr-soph list)  
 Jour 60—Graphic Arts: Processes (3)  
 (or) Jour 55—Newspaper Make-up and Typography (3)  
 Jour 71—Business News, Feature Writing (3)  
 (or) Jour 73—Magazine Writing (3)  
 Jour 53—Picture Editing (3)  
 (or) Jour 79—Advertising Copy Writing (3)  
 (or) Jour 90—Mass Communications and the News (3)  
 HEEd 90—Child Development (3)  
 PubH 50—Personal and Community Health (3)  
 (or) PubH 2 (see fr-soph list)  
 PubH 52—Home Nursing and Family Care (1)

**Suggested Electives**

- HE 125  
 HE 122A, B  
 HE 128

**TEXTILES AND CLOTHING MAJOR, JOURNALISM MINOR**

The following curriculum is planned for students who wish to write professionally concerning textiles and clothing in the areas of fashion and consumer education. The course of study is intended to prepare for positions connected with newspapers, magazines, and the educational divisions of textile manufacturers and pattern companies. In this field of work, the ability to use a typewriter is important.

The courses required in the curriculum are listed below. For this specialization a grade of at least C is required in the following courses: HE 3, 4, 50, and Jour 11, 41.

Students must meet the all-College requirements for graduation (see Index).

## FRESHMAN-SOPHOMORE YEARS

Orie 1—College Orientation Lectures (1)  
 HE 1—Choice and Care of Clothing (3)  
 HE 3—Clothing Construction A (3)  
 HE 4—Clothing Construction B (3)  
 HE 10—Introduction to Home Economics (1)  
 HE 17—Personal and Family Living (3)  
 HE 20—Introduction to Related Art (3)  
 HE 22—Beginning Costume Design (3)  
 HE 24—Problems in Home Planning and Furnishing (5)  
 HE 31—Introduction to Nutrition (3)  
 HE 40—Food Preparation (5)  
 HE 41—Food Management and Marketing (5)  
 HE 49—Household Equipment (3)  
 PubH 2—Personal and Public Health (2)  
 (or) PubH 50 (see jr-sr list)  
 Rhetoric—Freshman Communication requirement (9)  
 Rhet 22—Public Speaking (3)  
 6 credits from the following humanities areas: humanities, literature, philosophy, or non-studio courses in art, music, theater arts  
 Comp 27 or 28—Advanced Writing (3)  
 Jour 11—Reporting for Nonmajors (3)  
 Jour 18—Principles of Advertising (3)  
 (or) Psy 156 (see jr-sr list)  
 Jour 41—Publications Editing (3)  
 Soc 1A or Soc 1—Man in Modern Society (3)  
 Psy 1-2—General Psychology (6)  
 AgEc 1—Principles of Economics I (3) and  
 AgEc 2—Principles of Economics II (3)  
 (or) Econ 1-2—Principles of Economics (6)  
 InCh 4-5—General Inorganic Chemistry (10)  
 AgBi 1A—Introduction to Biochemistry (5)  
 Biol 1A-2A—General Biology (7)  
 DInd 20—Household Microbiology (4)  
 MeAg 35—Household Physics (5)  
 Physical education (3) (may be taken at any time during 4 yrs)

## JUNIOR-SENIOR YEARS

HE 50—Textiles (4)  
 HE 53—Advanced Clothing (3)  
 HE 76—Nutrition of the Family (4)  
 HE 85—Home Management Principles (3)  
 HE 86—Home Management Laboratory (4)  
 HE 102—Advanced Textiles (3)  
 HE 115—Economic and Social Aspects of Clothing (3)  
 (or) HE 116—Family Clothing Problems (3)  
 HE 120—Art History (3)  
 HE 125—Advanced Costume Design (3)  
 HEED 90—Child Development (3)  
 Rhet 51—Exposition (3)  
 BA 57—Principles of Marketing (3)  
 BA 107—Retail Management I (3)  
 Psy 156—Psychology of Advertising (3)  
 (or) Jour 18 (see fr-soph list)  
 Jour 55—Newspaper Make-up Typography (3)  
 Jour 73—Magazine Writing (3)  
 Jour 53—Picture Editing (3)  
 (or) Jour 74—Magazine Editing (3)  
 (or) Jour 79—Advertising Copy Writing (3)  
 (or) Jour 90—Mass Communications and the News (3)  
 PubH 52—Home Nursing and Family Care (1)  
 PubH 50—Personal and Community Health (3)  
 (or) PubH 2 (see fr-soph list)

## Suggested Electives

HE 127—Purchasing Home Furnishings (3)  
 Art 10—Photography (3)  
 (or) GC 26A—Photography (3)  
 BA 77—Advertising (3)  
 AgEc 126—Economics of Consumption (3)  
 Fren 1—Beginning French (5)

## 4. Home Economics Education

The curriculums in home economics education, offered jointly by the College of AFHE and the College of Education, are designed for students who plan to become home economics teachers in secondary schools or to assume home economics positions in the Agricultural Extension Service. Satisfactory completion of any one of the teaching curriculums (General Home Economics Teaching, Teaching Textiles and Clothing, Teaching Foods, Teaching Nutrition, or Teaching Related Art) will lead to qualification for a certificate for teaching home economics in secondary schools in Minnesota. This certificate qualifies the holder to teach in home economics departments which are federally aided.

During the first 2 years the student is registered in the College of AFHE and carries the required work of the home economics education curriculum. In the junior and senior years she completes the combined curriculum of the College of Education and the College of AFHE leading to the bachelor of science degree.

In the third quarter of the sophomore year, the student should make application for the combined curriculum at the Office of Admissions and Records, Coffey Hall. She will then complete the admission procedures of the College of Education which include speech, health, and psychological examinations and interviews. Admission to the combined curriculum is dependent upon:



1. Completion of a total of 90 credits with a grade point average of at least 2.00 (junior classification).
2. Attainment of an over-all grade point average of 2.50 in home economics courses required in the teaching curriculum.
3. Appraisal of other factors related to the student's fitness for teaching.

Application for student teaching should be made a quarter in advance of registration for HEEd 93, Supervised Teaching in Home Economics. The application form may be obtained in the home economics office, 212 McNeal Hall. Requirements for admission to student teaching are:

1. Completion of the College of Education examinations.
2. Completion of Ed 55A-B.
3. Grades of C or better in each of the following courses: HE 3, 4, 21, 40, 41.
4. A grade point average of 2.50 in home economics courses required in the teaching curriculum.

In order to be recommended for graduation from the teaching specialization, the student must have (a) completed at least 40 credits of home economics course work in the curriculum for general home economics teaching; (b) maintained a 2.50 grade point average in home economics courses required in the teaching curriculum; (c) completed the following home economics courses with a grade of at least C: HE 3, 4, 21, 40, 41, 76; (d) an average of 2 grade points per credit in all other courses pursued during the junior and senior year; and (e) meet the all-College requirements for graduation (see Index).

### HOME ECONOMICS TEACHING (General)

The following courses are required for those preparing for teaching general home economics.

#### FRESHMAN YEAR

- Orie 1—College Orientation Lectures (1)  
HE 1—Choice and Care of Clothing (3)

- HE 3—Clothing Construction A (3)  
HE 10—Introduction to Home Economics (1)  
HE 17—Personal and Family Living (3)  
HE 20—Introduction to Related Art (3)  
HE 21—Color and Design (3)  
HE 31—Introduction to Nutrition (3)  
HE 40—Food Preparation (5)  
PubH 5—Individual Public Health (3)  
(or) PubH 50 (see jr-sr list)  
Rhetoric—Freshman Communication requirement (9)  
Humanities (9) (may be taken from humanities, HE 120, literature, music, philosophy, non-studio art, or theater arts; courses may be taken on Mpls or StP Campus)  
Social science (15); Psy 1-2 (6); AgEc 1-2 (6) or Econ 1-2 (6); choice of sociology, social science, or history  
MeAg 35—Household Physics (5)  
(or) GC 7A—Physical Science: Elements of Physics (5)  
Biol 1A, 2A—General Biology (7) and Phsl 4—Human Physiology (4)  
(or) GC 10A-B—Human Biology (6)  
DInd 20—Household Microbiology (4)  
(or) MicB 53—General Bacteriology (5)  
InCh 4-5—General Inorganic Chemistry (10)  
(or) GC 7C—Physical Science: Elements of Chemistry (5)  
Physical education (3) (this requirement may be completed any time during 4 yrs)

#### SOPHOMORE YEAR

- HE 4—Clothing Construction B (3)  
HE 24—Home Planning and Furnishing (5) (preferably as 3rd qtr soph or jr)  
HE 41—Food Management and Marketing (5)  
HE 49—Household Equipment (3)  
Rhet 22—Public Speaking (3)  
AgBi 1A—Introduction to Biochemistry (5)  
AgEc 1—Principles of Economics I (3) and AgEc 2—Principles of Economics II (3)  
(or) Econ 1-2—Principles of Economics (6)  
Psy 1-2—General Psychology (6)

#### JUNIOR-SENIOR YEARS

- HE 50—Textiles (4)  
HE 76—Nutrition of the Family (4)  
(or) HE 170 and 171 (6)  
HE 85—Home Management Principles (3)  
HE 86—Home Management Laboratory (4)  
HE 185—Family Relationships (3)  
PubH 50—Personal and Community Health (3)  
(or) PubH 5 (see fr list)  
PubH 52—Home Nursing and Family Care (1)  
Rhet 51—Exposition (3)  
Ed 55A-B—Introduction to Secondary School Teaching (10)  
HEd 180—The School and Society (3)  
HEEd 90—Child Development (3)  
HEEd 91—Observation, Materials, Teaching in Home Economics (5) (parallel with HEEd 93)  
HEEd 92—Teaching Problems in Home Economics (2) (parallel with HEEd 94, 192, 194A)  
HEEd 93-94—Supervised Teaching in Home Economics (9)

HEED 192—Evaluation in Home Economics (2) (parallel with HEED 92, 94, 194A)

HEED 194A—Adult Education in Home Economics (3) (parallel with HEED 92, 94, 192)

One elective course in related art

Students who are exempt in a beginning course in home economics shall take an advanced course in the same area if such a course is available

9 elective credits shall be taken in at least 2 of these home economics areas: *Foods*: HE 70, 139, 140, 141; *Clothing*: HE 53, 115, 116; *Related Art*: HE 120, 127, 180; *Household Equipment*: HE 131; *Home Management and Family Relations*: HE 186.

## HOME ECONOMICS TEACHING (Specialization)

Those whose interests lead them into further specialization in the teaching field may choose one of the following groups. The student should plan her program early in her college course to be certain that she has the necessary prerequisites.

### Teaching Textiles and Clothing

To the requirements in general teaching add:

HE 102—Advanced Textiles (3)

HE 115—Economic and Social Aspects of Clothing (3)

HE 120—Art History (3)

### Teaching Foods

To the requirements in general teaching add:

HE 63—Quantity Food Purchasing and Production (5)

HE 70—Advanced Food Preparation (3)

HE 142—Experimental Cookery (3)

AnCh 57—Quantitative Analysis (4)

### Teaching Nutrition

Omit from the requirements in general home economics teaching the following courses:

HE 3, 4, 21, GC 7A-C, 10A-B

To the requirements in general teaching add:

HE 142—Experimental Cookery (3)

HE 173—Diet Therapy (4)

HE 179—Readings in Nutrition (2)

## Teaching Related Art

Those interested in teaching related art should (a) select the minimum requirement in science when there is an option; (b) add the following courses:

HE 23—Design Problems (3)

HE 25—Design Applied to Crafts (3)

HE 120—Art History (3)

HE 122A—Rendering Techniques for Interiors (3) and HE 122B—Advanced Interior Design (3)

(or) HE 125—Advanced Costume Design (3) and HE 128—History of Costume (2)

HEED 197—Organization and Methods for Related Art Teaching (1-3)

Art 1—Principles of Art (5)

Art 20—Elements of Drawing (2)

(or) Art 23—Drawing and Design I (3)

## HOME ECONOMICS EXTENSION

This is a joint curriculum with the College of Education. See all-College requirements for students in the College of AFHE.

Some students will be interested in preparing for home economics positions in the Agricultural Extension Service, such as home agents, 4-H Club agents, or homemaking specialists.

This curriculum is planned to give the future extension worker understandings and skills in homemaking activities, an understanding of physical and social science as it relates to rural areas, use of oral and written materials, ability to organize and administer adult and youth programs, and an understanding of educational principles and techniques suitable for rural groups.

Students following this curriculum will receive guidance from a committee of the home economics extension service and the home economics education faculty. Qualified students will be recommended for a period of supervised pre-extension field experience to be arranged following the junior year. Approval for this field service must be secured from the director of the Agricultural Extension Service.

Those preparing for home economics extension should modify the general home economics teaching curriculum as follows:

Omit the following from required courses:

AgBi 1A, Rhet 51, HEEd 92, HEEd 94

Add the following:

AgJo 53—Publicity (3)

Pol 1-2—American Government and Politics (6)

Soc 14 or 14A—Rural Sociology (3) or any of the following:

Soc 1 or 2 or 3—Introduction to Sociology (3)

Soc 91—Case Methods Applied to Study of Human Problems (3)

Soc 95—Introduction to Public Welfare (3)

Soc 140—Social Organization (3)

AgEc 8—Rural Economics (3)

(or) AgEc 126—Economics of Consumption (3)

HEEd 95—Field Experience (6) (parallel HEEd 190, 192, 194A)

HEEd 190—Readings (1-3) (parallel HEEd 95, 194A)

AgEd 56—Rural Education Through Extension Methods (3)

The required 3 credits in physical education are to be chosen from the dance (country, folk, modern, or social) and recreational games.

## PROFESSIONAL 5-YEAR CURRICULUM

This is a joint curriculum between the College of Education and the College of AFHE leading to the degree of master of education, M.Ed.

### Special Requirements

1. A total of 230 credits including at least 45 (in courses numbered above 100) in the fifth year

2. An average of B in courses in the fifth year

3. A satisfactory report on a health examination within 1 year prior to obtaining the M.Ed. degree

4. Satisfactory performance in requirements prescribed by the College of Education for professional degrees:

a. 90 credits in academic fields

b. A teaching minor or concentration in an academic field (18 credits)

c. Broad major field specialization (approximately 90 credits)

d. 35 credits in education including 1 quarter internship (optional—8 credits allowed for 1 quarter)

The best results may be anticipated when plans for the extended training are made during the student's junior year so that the fifth year may be integrated with the 4-year program. The student should plan her program under the direction of a member of the graduate faculty in home economics education.

Satisfaction of part of the education requirement may be made through internship in a home economics department in a secondary school. The internship will include full-time work for 1 quarter in school off the campus. The intern will work under the supervision of her adviser at the University and will return to the campus regularly for Saturday morning conferences which will deal with classroom, extracurricular, and community problems met during the internship.

In addition to the general requirements for the M.Ed. degree, the student must meet the specific requirements for the degree in this field, as follows:

Additional academic courses (8-24)

Home economics (17-25)

General education (4-9)

Home economics education (5-9)

Certification of competence in teaching in the major field

Students with a Bachelor's degree with a major in home economics education from other accredited institutions, upon fulfilling the requirements or their equivalents of the 5-year curriculum, will receive the master of education degree with a major in home economics education.

## 5. Home Economics and Nursery School Education

Promising students can be encouraged to pursue this combination in which a program is developed on an individual basis. The student and her proposed program must be approved by the director of the Nursery School and the director of the School of Home Economics. Through careful selection of courses from the Institute of Child Development, the Division of Curriculum and Instruction, the Department of Methods and Student Teaching, and the School of Home Economics, a program which will lead to certification for nursery school teaching in Minnesota can be developed.

In addition to the curriculum in general home economics, the following courses are required. These courses are open to juniors and seniors and are listed in the *Bulletin of the College of Education*. Students must meet the all-College requirements for graduation (see Index).

### JUNIOR-SENIOR YEARS

- EdCI 55—Foundations of Early Childhood Education (3)
- CD 80—Child Psychology (3)
- EdCI 57—Nursery School—Kindergarten Laboratory in Art, Literature, Social Studies, and Science (6)
- EdCI 59—Methods and Observation in Nursery School (2)
- EdT 77—Student Teaching in the Nursery School (4)

### Suggested Electives

- CD 83—Guidance of Children's Activities (3)
- CD 85—Psychological Appraisal of Child Behavior (3)
- CD 89—Psychology of Parent-Child Relationships (2)
- CD 140—Behavior Problems (3)
- CD 170—Parent Education (3)
- CD 180—Personality Development of Children (3)
- CD 181—Social Development of Children (3)
- CD 185—Children in Society (3)
- EdCI 63—Children's Literature (2)
- HE 171—Maternal, Child Nutrition (3)
- HE 185—Family Relationships (3)
- HE 187—Readings: Family Relationships (1-3)

## 6. Preparation for Research

- a. Major in Experimental Foods
- b. Major in Nutrition
- c. Major in Textiles and Clothing

These curriculums are planned for superior students who wish to be prepared to pursue graduate work with the expectation of filling a teaching or research position after receiving an advanced degree. The options and electives offered should be selected in consultation with a major adviser of the Graduate School faculty. A grade point average of 2.50 must be maintained.

Students selecting this curriculum must complete the courses listed under freshman-sophomore, junior-senior years and under 1 of 3 majors. They must also meet the all-College requirements for graduation (see Index).

### FRESHMAN-SOPHOMORE YEARS

- Orie 1—College Orientation Lectures (1)
- Rhetoric—Freshman Communication requirement (9)

- HE 1—Choice and Care of Clothing (3)
- HE 10—Introduction to Home Economics (1)
- HE 17—Personal and Family Living (3)
- HE 20—Introduction to Related Art (3)
- HE 31—Introduction to Nutrition (3)
- HE 40—Food Preparation (5)
- Biol 1A-2A—General Biology (7)
- DInd 20—Household Microbiology (4)
- (or) MicB 53—General Bacteriology (5)
- Phel 4—Human Physiology (4)
- InCh 4-5—General Inorganic Chemistry (10)
- InCh 11—Semimicro Qualitative Analysis (4)
- (or) InCh 26—Introduction to Chemical Principles (5)
- MeAg 35—Household Physics (5)
- (or) Phys 4-5-6—General Physics (15)
- Soc 1A or 1—Man in Modern Society (3)
- Physical education (3) (may be taken at any time during 4 yrs)
- Mathematics (10)
- AgEc 1—Principles of Economics I (3)
- AgEc 2—Principles of Economics II (3)
- 9 credits from literature, humanities, music, art, HE 120, philosophy, theater arts (except studio or technical courses)
- HE 24—Problems in Home Planning and Furnishing (5)
- HE 41—Food Management and Marketing (5)
- HE 49—Household Equipment (3)
- Rhet 22—Public Speaking (3)
- Psy 1-2—General Psychology (6)

OrCh 41-42 or 61-62—Elementary Organic Chemistry (8 or 10)  
AnCh 57—Quantitative Analysis (4)

HE 88—Introduction to Food Quality Evaluation (3)  
HE 170—Nutrition Principles (3)

### JUNIOR-SENIOR YEARS

PubH 52—Home Nursing and Family Care (1)  
PubH 2—Personal and Public Health (2)  
(or) PubH 50—Personal and Community Health (3)  
HE 50—Textiles (4)  
HE 85—Home Management Principles (3)  
HE 86—Home Management Laboratory (4)  
Rhet 51—Exposition (3)  
HEEd 90—Child Development (3)  
Biom 90—Introductory Statistics (3)

### MAJOR IN EXPERIMENTAL FOODS

In addition to the foregoing courses, a major sequence in experimental foods must include the following:

HE 70—Advanced Food Preparation (3)

### MAJOR IN NUTRITION

In addition to the foregoing courses, a major sequence in nutrition must include the following:

HE 33—Nutrition I (4)  
HE 170—Nutrition Principles (3)  
HE 171—Maternal and Child Nutrition (3)

### MAJOR IN TEXTILES AND CLOTHING

In addition to the foregoing courses, a major sequence in textiles and clothing must include the following courses:

HE 3—Clothing Construction A (3)  
HE 102—Advanced Textiles (3)  
HE 76—Nutrition of the Family (4)  
(or) HE 170—Nutrition Principles (3) and  
HE 171—Maternal and Child Nutrition (3)

## 7. General Home Economics

This curriculum is designed primarily for those who expect to become full-time homemakers and wish a broad general education rather than professional preparation.

Students in this curriculum may concentrate their electives in a particular area and thus plan a specialized program for which there is no presently organized curriculum. Such specialized programs might emphasize household equipment or preparation for executive housekeeping positions.

### FRESHMAN YEAR

Orie 1—College Orientation Lectures (1)  
HE 1—Choice and Care of Clothing (3)  
HE 3—Clothing Construction A (3)  
HE 10—Introduction to Home Economics (1)  
HE 17—Personal and Family Living (3)  
HE 20—Introduction to Related Art (3)  
HE 31—Introduction to Nutrition (3)  
HE 40—Food Preparation (5)  
Rhetoric—Freshman Communication Requirement (9)  
Soc 1A or Soc 1—Man in Modern Society (3)  
Physical education (3) (may be completed any time during 4 yrs)

PubH 2—Personal and Public Health (2)  
(or) PubH 5—Individual and Public Health (3)  
(or) PubH 50 (see jr-sr list)  
Humanities (9) (may be selected from humanities, literature, philosophy, or non-studio courses in art, music, and theater arts)  
Biol 1A-2A—General Biology (7) and Phsl 4—Human Physiology (4)  
(or) GC 10A-B—Human Biology (6)  
DInd 20—Household Microbiology (4)  
(or) MicB 53 (see soph list)  
InCh 4-5—General Inorganic Chemistry (10)  
(or) GC 7C—Physical Science: Chemistry (5)  
MeAg 35—Household Physics (5)  
(or) GC 7A—Physical Science: Physics (5)

### SOPHOMORE YEAR

HE 4—Clothing Construction B (3)  
HE 24—Problems in Home Planning and Furnishing (5)  
HE 41—Food Management and Marketing (5)  
HE 49—Household Equipment (3)  
Rhet 22—Public Speaking (3)  
MicB 53—General Bacteriology (5)  
(or) DInd 20 (see fr list)  
AgBi 1A—Introduction to Organic Chemistry (5)  
AgEc 1—Principles of Economics I (3)  
AgEc 2—Principles of Economics II (3)

Six additional social science credits to be selected from:

Pol 25—World Politics (3)

Pol 1-2—American Government and Politics (6)

Anthropology, geography, history, political science, or sociology

Psy 1-2—General Psychology (6)

#### JUNIOR-SENIOR YEARS

HE 50—Textiles (4)

HE 76—Nutrition of the Family (4)

(or) HE 170—Nutrition Principles (3) *and*

HE 171—Maternal and Child Nutrition (3)

HE 85—Home Management Principles (3)

HE 86—Home Management Laboratory (4)

HE 120—Art History (3)

HE 127—Purchasing Home Furnishings (3)

(or) HE 131—Laboratory Problems in Household Equipment (3)

HE 185—Family Relationships (3)

PubH 50—Personal and Community Health (3)

(or) PubH 2, 5 (see fr list)

PubH 52—Home Nursing and Family Care (1)

Rhet 51—Exposition (3)

Rhet 54—Advanced Public Speaking (3)

(or) AgJo 53—Publicity (3)

HEED 90—Child Development (3)

#### GENERAL HOME ECONOMICS WITH HOUSEHOLD EQUIPMENT

Students who want specialization in household equipment should elect at least 6 credits in household equipment in addition to HE 49. Also they should confer with the chairman of the Division of Household Equipment on choice of other electives.

### III. DESCRIPTION OF COURSES

The courses offered in the College of Agriculture, Forestry, and Home Economics are described below. They are grouped by departmental offerings and listed in numerical sequence within departments. Courses in the College of Veterinary Medicine available to students in agriculture are listed at the close of this section. Description of courses offered by other colleges of the University but taken by students enrolled in agriculture, forestry, or home economics will be found in the bulletin of the college offering the course. However, certain courses offered by other colleges but scheduled on the St. Paul Campus primarily for students in agriculture, forestry, and home economics are described at the end of this section.

Courses primarily for freshmen and sophomores are numbered 1 through 49; for juniors and seniors, 50 through 99; for juniors, seniors, and graduate students, 100 through 199. Courses numbered 200 or above will be found in the *Bulletin of the Graduate School*.

If no prerequisites are listed, there are none, except in so far as the course number indicates a minimum class standing requirement.

**Symbols**—The following symbols are used throughout this bulletin and will carry no page footnotes.

\* Graduate students may prepare Plan B papers.

† To receive credit, all courses listed before the single dagger must be completed.

‡ Students may enter sequence course in any quarter which precedes the double dagger.

§ No credit is granted if credit was received for equivalent course listed after section mark.

¶ Concurrent registration is allowed with the course listed after paragraph mark.

# Consent of instructor is required.

△ Consent of department or school offering course is required.

x After a course number indicates course is offered more than 1 quarter.

#### Agricultural Biochemistry (AgBi)

This department offers two types of training: (a) courses designed to train students for research or instruction in biochemistry, and (b) courses for students whose main studies are in those other departments which require some training in biochemistry.

Students planning to specialize in agricultural biochemistry in the science specialization curriculum should secure a broad foundation of courses in chemistry, biology, physics, and mathematics.

The following courses are suggested as providing the essential basic training for the junior-senior years and for the first year of postgraduate work: OrCh 61, 62, 63, 64 (14 credits); Phys 4-5-6 or 7-8-9 (15 credits); mathematics through integral calculus; PCh 101-102-103 (12 credits); Agro 30 (3 credits); Biom 90, 100, 101; AnCh 57; AgBi 100-101-102, 110-111-112, 119, 120, 121, 122, 123, 124, 129 and either 103, 113, 116 or 108, 109, depending on whether the student's interest lies in animal or plant biochemistry.

For those students who plan to specialize later in the animal phases of biochemistry, certain courses in animal husbandry, dairy husbandry, zoology, bacteriology, or physiology should be included in the junior-senior years. Similarly for those desiring to specialize in the plant phases of biochemistry, courses in botany, plant genetics, plant pathology, forestry, plant physiology, and bacteriology are desirable adjuncts. These supporting subjects should be selected in consultation with the student's major adviser.

- 1A. **Introduction to Biochemistry.** A terminal survey course comprising lectures and discussions on the composition, chemical structure, properties and uses of components of living systems and their products. Special emphasis will be placed on those compounds which, as the principal products of microbial, plant and animal life, have a direct impact upon the life and activities of man. (5 cr; prereq InCh 4 and 5 or equiv)
3. **Introduction to Biochemistry.** Discussion of the fundamentals of biochemistry, chemistry of carbohydrates, proteins and fats, enzymes, colloids, hydrogen ion concentration, and other essential subject matter. (3 cr; prereq OrCh 42 or 62)
5. **Plant Biochemistry.** Introduction to the chemistry, metabolism, and nutrition of plants based on the organic and inorganic compounds characteristic of plants and plant products, and their reactions and interactions. (3 cr; prereq 3 or equiv)
6. **Animal Biochemistry.** Introduction to the chemistry, metabolism, and nutrition of animals based on the organic and inorganic compounds characteristic of animals and animal products, and their reactions and interactions. (3 cr; prereq 3 or equiv)
10. **Dairy Chemistry.** Lectures and laboratory work on the physical and chemical properties of milk and dairy products. (5 cr; prereq 3)
- 100-101-102. **General Biochemistry.** Lectures on the structure, physical and chemical properties, and functions of compounds of biological importance. (3 cr per qtr; prereq ¶110-111-112 except with Δ, AgBi 3 or 12 cr organic chemistry)
103. **Advanced Dairy Chemistry.** Lectures on the physical, colloidal, and chemical properties of milk and dairy products. (3 cr; prereq ¶113 except with #, 10, 102)
105. **Plant Biochemistry.** Same as AgBi 5 except that a term paper is required.
106. **Animal Biochemistry.** Same as AgBi 6 except that a term paper is required.
108. **Chemistry of Wheat and Wheat Products.** Lecture course, with collateral library reference work, on the chemical technology of the production and milling of wheat and its conversion into food. (3 cr; prereq 5)
109. **Flour Laboratory Methods.** Laboratory course. Analysis of wheat and its products. Designed to train students for research in the cereal industry. (3-5 cr; prereq 108 or ¶108, AnCh 57 or equiv)
- 110-111-112. **General Biochemistry Laboratory.** Laboratory work paralleling, and required of all who are registered in, AgBi 100-101-102, except with permission of department head. (2 cr per qtr; prereq ¶100-101-102)
113. **Advanced Dairy Chemistry Laboratory.** Laboratory work paralleling, and required of all who are registered in, AgBi 103, except with permission of instructor. (2 cr; prereq ¶103)
116. **Advanced Metabolism.** Biochemistry of intermediary metabolism. (3 cr; prereq 102 or #)
118. **Laboratory Problems in Biochemistry.** Laboratory work in preparation and isolation of pure compounds, and special methods of identification or determination of biochemical products. (3-5 cr; prereq #)
119. **Physical Biochemistry.** Lectures and assigned reading on colloid chemistry, surface chemistry, molecular kinetics and their application to biochemical materials and processes. (3 cr; prereq 102 or #...Phys 9 advised)
120. **Advanced Protein Chemistry.** Lectures and assigned reading on composition, structure, chemical and physical properties, and the biochemical functions of proteins and amino acids. (2 cr; prereq 102 or #)
121. **Advanced Carbohydrate Chemistry.** Lectures and assigned reading on the composition, structure, chemical and physical properties, and the biochemical functions of the carbohydrates. (2 cr; prereq 102 or #)
122. **Advanced Lipid Chemistry.** Lectures and assigned reading on the composition, structure, chemical and physical properties, and the biochemical functions of the fats and fat-like compounds. (2 cr; prereq 102 or #)
123. **Advanced Enzyme Chemistry.** Lectures and assigned reading on the nature and function of enzymes. (2 cr; prereq 102 or #, PCh 102 or equiv)



124. **Vitamins.** Lectures and assigned reading on the biochemistry of vitamins and their physiological action. (3 cr; prereq 6, 102 or #)
129. **Physical Biochemistry Laboratory.** Preparation, purification, and study of physicochemical properties of inorganic and biocolloid systems. (2 cr; prereq AnCh 57 or equiv, 102 or #)

For Graduate Students Only

- 203x.\* **Research Problems**
- 204x. **Tracer Techniques**
- 205x.\* **Special Topics in Biochemical Literature**
- 208x. **Cereal Chemistry Seminar**
- 213x. **Seminar in Dairy Chemistry**
- 216x.\* **Nutrition and Enzymes Seminar**
- 219x.\* **Colloid Chemistry Seminar**
- 220x.\* **Protein Chemistry Seminar**
- 221x.\* **Carbohydrate Chemistry Seminar**
- 222x.\* **Chemistry of Lipids Seminar**
- 224x.\* **General Seminar**

## Agricultural Economics (AgEc)

Students majoring in agricultural economics work out a program suited to their needs in consultation with an adviser in the department. Opportunities are available for specialization in various fields such as farm management, marketing, agricultural prices, and farm finance. Among the courses recommended for majors are AgEc 3, 25, 30, 40, 50, and 82.

1. **Principles of Economics I.** A descriptive and institutional background for understanding the organization and development of our economic system; alternative economic systems; basic economic concepts concerning price determination, profit maximization, and resource use. (3 cr)
2. **Principles of Economics II.** (Continuation of AgEc 1) Major emphasis upon determinants of national income and employment levels; prices and money; functioning of our banking system, monetary and fiscal policies, business cycles, and expanding role of government; economic growth and development. (3 cr; prereq 1)
3. **Principles of Economic Analysis.** Value and distribution; factor and product price determination; market mechanism; demand and supply analysis; theory of consumption; equilibrium analysis; theory of production and marginal analysis. (3 cr; prereq 2)
12. **Farm Management.** The farm as a unit; co-ordination of crops, livestock, machinery, labor; the nature and process of management. (3 cr; prereq 2)
25. **Principles of Accounting.** (4 cr; for AFHE students only; prereq soph)
30. **Agricultural Prices.** Factors determining prices and trends in prices of agricultural commodities. Adjustment of production to price changes. Foreign competition. Price stabilization. Price policies. (3 cr; prereq soph, 2)
40. **Principles of Marketing Organization.** Principles of the organization of the market and of marketing enterprises, both proprietary and co-operative. (3 cr; prereq soph, 2)
50. **Farm Finance.** The mechanism of exchange, with special reference to financing the production and marketing of farm products. (5 cr; for students in agriculture and forestry only; prereq # for soph, 2)
80. **Farm Accounting.** Kinds and uses of farm records; calculation of measures of farm earnings; accounting analysis of farm business. Discussion and practice. (3 cr; prereq 12 or 82)

82. **Farm Planning.** Farm business diagnosis; farm budgeting; use of principles of economics in managing a farm and interpreting experimental data for farm use; analysis of a farm. (3 cr; prereq 2)
99. **Special Problems.** Primarily for supervised reading and research on special problems not covered in regularly offered courses and preparation for intercollegiate debating. (1-3 cr per qtr, total 6 cr; prereq major or minor in agricultural economics or agricultural business administration and #)
101. **Statistical Methods for Social Sciences.** Extension of Biom 100 with emphasis on application of statistical methods to research in the social sciences; multiple regression and correlation, analysis of variance and covariance, index numbers, elementary sampling procedures. (4 cr; prereq Biom 100 or equiv)
107. **Farm Work Simplification.** Principles and methods of accomplishing farm work in less time and with less effort. Methods of analyzing jobs, principles of motion economy, efficient working methods for different farm enterprises. Practice in planning improved working methods. (3 cr; prereq 2)
- 108.° **Agricultural Policy.** Economic problems and issues in American agriculture, including organization of the agricultural industry, tenancy, farm incomes, standards of living, taxation and foreign agricultural programs; policies adopted by governmental, agricultural, and other agencies toward such problems. (3 cr, §8)
110. **Economics of Agricultural Production.** Principles of production economics applied to agriculture, special emphasis being placed upon profitable combinations of factors of production, comparative advantage, and localization of production. (3 cr; prereq 3 or 82)
126. **Economics of Consumption.** Nature of human wants; standards of living; theory of consumer behavior; nature of demand; demand and price; income and consumption; relation of consumption to the population problem. (3 cr; prereq 2)
- 127.° **Economics of Food Consumption and Distribution.** Review of consumption trends; relation of food consumption to price, income, and other variables, economic implications of nutrition, consumption-production balance, food consumption problems, food policy. (3 cr; prereq 2 or #)
131. **Market Prices.** The nature of demand for farm products; supply considerations; price formulation and structure of markets; price variation and instability; dynamic analysis. (3 cr; prereq 30)
140. **Grain Marketing.** (3 cr; prereq 40)
141. **Dairy Marketing.** (3 cr; prereq 40)
142. **Fruit and Vegetable Marketing.** (2 cr; prereq 40)
143. **Livestock and Poultry Marketing.** (3 cr; prereq 40)
- 144.° **Co-operative Organization.** Development of co-operation in agriculture in the United States and foreign countries. Analysis of economic problems peculiar to co-operative organizations, especially of marketing agencies. (3 cr; prereq 40; offered 1962-63 and alt yrs)
- 147.° **Marketing Accounting.** Interpretations of accounts, statement preparation, and analysis. Accounting methods and statements of agricultural marketing organizations including co-operative associations. Utilization of accounting data and statements by the management. (4 cr; prereq 25 or equiv; offered 1961-62 and alt yrs)
- 150.° **Advanced Farm Finance.** Consideration of credit problems of farmers with special attention to credit principles, policies, and financial institutions. (3 cr; prereq 50 or equiv)
- 170.° **Land Economics.** Land as a factor of production; rural and urban utilization; rents and land values; land classification; land exchange. (3 cr; prereq 110 or #)
- 172.° **Economics of World Agriculture.** Distribution, quality, and utilization of agricultural resources; variations in population densities and characteristics; internal organization and techniques; comparative advantage; world trade in agricultural products; national and international policies relating to agriculture; future trends and prospects. (3 cr)
- 180.° **Farm Accounting.** Same as AgEc 80 plus a special problem. (3 cr; prereq #)
183. **Advanced Farm Planning.** Special problems in farm planning. (3 cr; prereq #)

For Graduate Students Only

- 200-201-202.° General Seminar in Agricultural Economics
- 208.° Seminar in Agricultural Price and Income Policies
- 211.° Economics of Agricultural Production II
- 221.° Farm Management Research Methods
- 226.° Seminar in Farm Management
- 235.° Methods of Price Analysis
- 241.° Seminar in Marketing
- 244.° Seminar in Co-operative Marketing
- 246.° Seminar in Economics of Consumption
- 270.° Seminar in Land Tenure

**Agricultural Education (AgEd)**

- 20. **Rural Education and Community Leadership.** Appraisal of community educational agencies; process of and responsibilities for community leadership; role of the school in the rural community; co-ordination of the school with nonschool educational agencies. (3 cr)
- 56. **Rural Education Through Extension Methods.** Role of the Extension Service in rural education; methods and techniques of instruction in nonschool educational programs. (3 cr; prereq soph)
- 81. **Teaching Agriculture in the Secondary School.** Fundamentals of teaching agriculture to high school students; use of the home, farm, and community in structuring courses of study; Future Farmers of America; Vo-Ag Planning and Summary Book; building and utilizing teaching units. (4 cr; prereq Ed 55B or §Ed 55B)
- 91. **Student Teaching.** Supervised experience in work of agriculture instructor. Includes instruction in development of individual farming programs, contacting parents, program analysis of community needs, conducting classes, community activities, Future Farmers, and case studies. (6 cr; prereq sr, 81, Ed 55B, and §)
- 101. **Young Farmer Education in Agriculture.** Developing and organizing a continuing program of educational activities for farm youth not in school and not established in an occupation. Co-ordinating community resources, determining needs, deriving goals and individual plans of procedure for establishment in farming and related occupations. Observation of young farmer programs. (4 cr; prereq sr)
- 103. **Adult Education in Agriculture.** Systematic instruction for established farmers. Analysis of the agricultural situation with special emphasis on adoption of appropriate management practices. Determining needs in production, marketing, credit, conservation, etc. Developing a continuing program. Observation of adult education programs. (4 cr; prereq sr)
- 104. **Planning Programs.** Developing a program of agricultural education in a community school. Integration with total school program. Administrative relationships and professional improvement. (3 cr; prereq last qtr undergrad regis or §)
- 120.° **Rural Education and Community Leadership.** Same as AgEd 20, with additional reading and special problem required. (3 cr; prereq grad or §)
- 121. **Enterprise Analysis.** Analyzing the farm business as a basis for identifying problems. Planning learning experiences to improve farm management at the high school, young farmer, and adult levels. (3 cr; prereq sr, or §)
- 141. **Supervised Farm Practice in Vocational Agriculture.** Selection, planning, supervising, and summarizing of individual farming programs. Adaptation to meet needs of high school F.F.A. students, young farmers, and adults. (3 cr per qtr, total 9 cr; prereq grad or §, 10 cr in education or §)
- 145. **The Integrated Course of Study in Agriculture.** Philosophy, organization, and administration of instruction in agriculture departments in secondary schools. (3 cr; prereq sr, 10 cr in education)

- 156.° Rural Education Through Extension Methods. Same as AgEd 56 with additional reading and special problem required. (3 cr; prereq grad or #)
171. Procedures in Teaching Agriculture. Emphasizes working out the problems in detail in order that results might be directly applicable to a particular farming situation. Evaluation of procedure on a basis of improved farming practices. (3 cr; prereq #)

For Graduate Students Only

- 221x. Field Problems
- 232x.° Research in Agricultural Education
- 250x. Supervision of Vocational Agriculture
- 283x. Organization and Administration of Educational Programs in Agriculture
286. Current Issues in Agricultural Education
- 291x. Seminar in Agricultural Education

## Agricultural Engineering

Students in agricultural science may take their major or minor in the field of mechanized agriculture. The field embraces the practical phases of technology as applied to agriculture, including farm machinery and power, farm buildings, drainage and irrigation, soil erosion control, and farm home conveniences. Because of the broad scope of the field, students majoring in it are advised to consult with the department for assistance in outlining a program of study.

A professional 5-year course of study in agricultural engineering is offered jointly with the Institute of Technology. Information on this curriculum is given in the *Bulletin of the Institute of Technology*.

### *Mechanized Agriculture (MeAg)*

2. **Technical Drawing Problems.** An abbreviated course in technical drawing for students who have had 1 or more years of high school mechanical drawing. Application of technical drawing to land surveys and mapping and to plans and elevations of buildings. (1 cr, §3; prereq 1 yr high school mechanical drawing)
3. **Technical Drawing.** Drafting instruments and their uses. Lettering, scale reading, conventional symbols, tracings, and reproductions. Multiview drawings, pictorial drawings, plats of surveys, and contour maps. (3 cr, §2)
4. **Agricultural Shop—Metalwork.** Arc and oxyacetylene welding, soldering, use and conditioning of metalworking tools, and the identification and characteristics of metals used in farm machinery. (4 cr; prereq InCh 4 or high school chemistry or #)
7. **Farm Building Construction.** Lecture and laboratory. Site selection, layout, construction details, building materials. (3 cr)
12. **Agricultural Machinery.** Machinery as a factor in agricultural production; development and use. (3 cr)
- 12A. **Agricultural Machinery Laboratory.** Studies of design and adjustment of agricultural machines. (1 cr; prereq 12 or §12)
14. **Farm Buildings.** Arrangement, planning, and economics of farm buildings. Requirements of animal shelters, crop and machine storage buildings, and farm homes. (3 cr)
23. **Beginning Physics.** Elements of physics. Mechanics, heat, light, and electricity, with laboratory work. (5 cr; prereq Math Y)
24. **College Physics I.** Applied course involving lectures and laboratory work in mechanics and heat. (4 cr; prereq Math T and 10)
25. **College Physics II.** Lecture, recitation, and laboratory course in electricity and light. (4 cr; prereq 24)
35. **Household Physics.** Lecture, laboratory, and experimental demonstrations of selected principles in physics, with special attention to those involved in household appliances and processes. (5 cr)

39. **Rural Sanitation and Water Supply.** Wells, pumps, and water supply. Sanitary water supply and sewage disposal systems for the farmstead. (3 cr; prereq 23 and Math Y)
42. **Surveying.** Use of steel tape, engineers level, hand level, transit, and plane table for field measurements. Application to topographic surveying and mapping, area determination, and road layout. (4 cr; prereq 3, Math T)
45. **Engines and Tractors.** Elementary principles of internal combustion engines and tractors. (3 cr; prereq 23)
- 45A. **Engines and Tractors Laboratory.** Studies of operating principles and tests of internal combustion engines and tractors. (1 cr; prereq 45 or ¶45)
55. **Electricity in Agriculture.** Elementary theory of electricity, circuits, and instruments. Application of electrical energy to agriculture. Selection and maintenance of equipment. Electrical safety. (2 cr; prereq 23 and Math Y)
65. **Materials Handling on the Farmstead.** Farmstead materials handling systems and components: conveying equipment, metering devices, collection and distribution methods. (3 cr; prereq 12 and 55; 2 lect and 3 lab hrs per wk)
70. **Dairy Engineering.** Refrigeration equipment, steam boilers, heat transfer, insulating materials, and fluid flow as applied to the dairy processing plant. (3 cr; prereq 23; offered 1961-62 and alt yrs)
106. **Hydrology and Erosion Control.** The hydrologic cycle and its various phases—precipitation, infiltration, transpiration, runoff, and evaporation. Climate. Engineering methods for controlling soil erosion: strip cropping, terracing, grass waterways, and structures. Farm ponds. (3 cr; prereq Soil 1 or 3 or 19 and Math Y)
107. **Drainage and Irrigation.** General theory, design, economical feasibility, and legal responsibilities of drainage and irrigation practices. (3 cr; prereq Math Y, Soil 1 or 3 or 19)
108. **Field Problems in Soil and Water Conservation.** Elementary surveying, design and layout of drainage, erosion control, and irrigation systems for the conservation of soil and water. (4 cr; prereq 106 or 107)
114. **Special Problems in Farm Buildings.** Problems based on work given in the prerequisite courses. (2-4 cr; prereq 3, 7 and 14)
124. **Agricultural Machinery and Mechanical Power Management.** Machinery and power management and use, and its cost as a factor in agricultural production. Lectures and special problems. (3 cr; prereq 9 cr in mechanized agriculture, incl 12 and 23)
125. **Topics in Agricultural Physics.** Advanced study of the essential physical principles involved in the utilization of electricity in agriculture. (3 cr; prereq Phys 50...or integral calculus and 25 or equiv)
127. **Principles of Radioisotope Measurements.** Theory and technique of radioisotope measurements including atomic and nuclear structure; properties of alpha, beta, and gamma rays; interaction of radiation with matter. Geiger-Muller proportional and scintillation counters. (3 cr; prereq sr, 1 yr physics, Math T; 2 lect and 3 lab hrs per wk)
130. **Instructional Methods in Farm Mechanics.** Planning high school farm shops including building layouts, equipment organization, tool and supply selection, and storage methods. Administering farm mechanics programs, demonstrations, job records, and farm mechanics problems relating to the student's farming program. (3 cr; prereq 4, 23, AgEd 91 or ¶AgEd 91)
131. **Problems and Field Studies in Advanced Farm Mechanics.** Farm mechanics principles and skills necessary for efficient operation, maintenance, and service of modern mechanical farm equipment. (3-9 cr; prereq 130)

### ***Agricultural Engineering (AgEn)***

The following courses are offered in the Institute of Technology and are open only to students in the professional 5-year curriculum. For descriptions of courses see the *Bulletin of the Institute of Technology*.

9. **Laboratory.** Engineering materials, their characteristics and use. (1 cr; 2 lab hrs per wk)

10. **Laboratory.** Introduction to agricultural engineering applications. (1 cr; 3 lab hrs per wk)
62. **Farm Structures.** (3 cr; prereq MM 41 or ¶MM 41; 2 lect and 3 lab hrs per wk)
72. **Principles of Farm Machinery.** (3 cr; prereq ME 24 or ¶ME 24; 2 lect and 3 lab hrs per wk)
82. **Introduction to Soil and Water Management.** (3 cr; 3 lect hrs per wk)
- 101-102. **Summer Employment I and II.** (2 cr per qtr; prereq completion of 3rd yr work and Δ)
125. **Topics in Agricultural Physics.** (3 cr; prereq Phys 50 or integral calculus and 25 or equiv)
141. **Agricultural Drainage.** (3 cr; prereq 82, Hydr 103, Soil 19; 3 lect hrs per wk)
142. **Erosion Control Engineering.** (3 cr; prereq 82, Hydr 103, Soil 19; 3 lect hrs per wk)
143. **Irrigation.** (3 cr; prereq 82, Hydr 103, Soil 19; 3 lect hrs per wk)
147. **Design and Management of Farm Machinery.** (3 cr; prereq 72; 2 lect and 3 lab hrs per wk)
149. **Radioisotope Measurements.** (3 cr; prereq Phys 50, ITM 26A; 2 lect and 3 lab hrs per wk)
159. **Agricultural Engineering Instrumentation.** (3 cr; prereq EE 37; 2 lect and 3 lab hrs per wk)
167. **Advanced Farm Structures.** (3 cr; prereq ME 160, CE 37; 2 lect and 3 lab hrs per wk)
170. **Agricultural Tractors.** (3 cr; prereq ME 121, 150; 2 lect and 3 lab hrs per wk)
171. **Design of Agricultural Machinery.** (3 cr; prereq 147, ME 121; 1 lect and 6 lab hrs per wk)
172. **Agricultural Machine Analysis.** (3 cr; prereq 171, MM 142; 1 lect and 6 lab hrs per wk)
176. **Management of Power and Machinery.** (3 cr; prereq 147; 2 lect and 3 lab hrs per wk)
179. **Agricultural Process Engineering.** (3 cr; prereq ME 160; 2 lect and 3 lab hrs per wk)
180. **Agricultural Hydrology and Flood Control.** (3 cr; prereq 142 or ¶142; 3 lect hrs per wk)
181. **Field Problems in Soil-Water Management.** (3 cr; prereq 141, 142, 143, or ¶141, ¶142, ¶143; 2 lect and 6 lab hrs per wk)
- 191-192-193.† **Problems in Agricultural Engineering.** (2-6 cr per qtr; prereq #)

For Graduate Students Only

200. Seminar

211-212-213.°† Advanced Problems and Research

## Agricultural Journalism (AgJo)

53. **Publicity.** For students planning careers in agriculture or some allied industry in which the co-operation of the press and radio will be needed. Covers mass media relationships, news writing, radio broadcasting, and preparation of visuals. (3 cr; prereq rhet comm req)

## Agronomy and Plant Genetics (Agro)

Students may major in either agronomy or plant genetics. Students in agricultural science may prepare for a farming vocation or for positions in the fields of agricultural extension, federal and state regulatory work, crop and seed production,

and sales. Students in science specialization, usually after 1 or more years of graduate work, may enter the fields of research in agronomy or plant genetics in experiment stations, may be employed in federal service, may go into teaching in colleges or universities, or may engage in agronomic or plant breeding research with agricultural industries.

**Major in Agricultural Science**—Recommended courses for a major in agricultural science are the following: Agro 21, 22, 27, 30, 77, 132, 134, 135; PIPa 1, 3, 111; Soil 20, 123; Biom 90, 100. From 3 to 6 credits in other plant science courses may be added with the approval of the adviser.

**Major in Science Specialization**—A major sequence in either agronomy or plant genetics may be arranged in consultation with the major adviser. The courses will be selected in relation to the major interest of the student and may include any courses fundamental to training in plant science.

**Minor Sequence**—Minor should be chosen in consultation with the major adviser. Students in agricultural science usually should choose a minor in another field of agricultural science which is most likely to prepare them for their vocational objective. Students in science specialization should choose a minor in a science field related to their interests.

1. **Introduction to Agronomy.** Principles of field crop development, adaptation, and distribution as they apply to the production, use, and improvement of the major groups of economic plants. (4 cr)
21. **Grain and Oilseed Crops.** Production, improvement, and uses of corn, small grains, and oilseed crops. Lectures and laboratory. (4 cr; prereq 1 or #; grad students take 121)
22. **Crop Grading and Identification.** Development of grades, study of grading methods, and actual practice in grading grain and in identification of crops, weeds, and diseases. Lecture and laboratory. (3 cr; prereq 1; grad students take 122)
27. **Forage Crops.** Distribution, characteristics, production, preservation, and uses of forage crops grown for pasture, grass silage, hay, soil improvement, and other purposes. Forage crops of North Central area are emphasized primarily. Lectures and laboratory. (4 cr; prereq 1 or #; grad students take 127)
30. **Introduction to Genetics.** Fundamentals of heredity and variation and their relationships to evolution, plant and animal breeding, eugenics, and mental and physical health of man. (3 cr; prereq soph, Biol 2, or equiv)
50. **Crop Judging.** Laboratory practice in identification of crops, weeds, and diseases, and in judging and grading of farm crops. (4 cr; prereq 22)
77. **Reviews of Literature in Agronomy.** Critical studies and discussions of problems in agronomy. (1 cr; prereq sr, 9 cr in agronomy)
121. **Grain and Oilseed Crops.** (See Agro 21) Graduate students must carry out a special problem. (4 cr; prereq 1 or #)
122. **Crop Grading and Identification.** (See Agro 22) Graduate students must do special work. (3 cr; prereq 1 or #)
127. **Forage Crops.** (See Agro 27) Graduate students are required to write a term paper in addition to regular requirements. (4 cr; prereq 1 or #)
131. **Principles of Genetics.** Physical basis of heredity, laws of inheritance, sex determination, linkage and crossing-over, mutations. Lectures and laboratory. (4 cr; prereq 30 or equiv)
132. **Farm Crops Plant Breeding.** Applied genetics. Methods of breeding each of the important agricultural crops. Lecture and laboratory problems. (4 cr; prereq 30 or equiv)
134. **Advanced Forage Crops.** Principles of hay and pasture management, preservation and utilization, factors affecting nutritive value, forage mixtures, forage crops of other areas of the world. Lectures, laboratory, and field trips. (4 cr; prereq 27)

135. **Weed Control.** Survey of the organization and functions of public and private research agencies for weed control and federal and state regulatory bodies; discussions of preventive, cultural, and chemical methods of weed control; study of equipment and techniques for weed control research. (3 cr; prereq 1 and PIPa 3)

For Graduate Students Only (Agronomy)

- 201.<sup>o</sup> **Research in Farm Crops**  
 202.<sup>o</sup> **Farm Crops Seminar**  
 203. **Advanced Studies in Agronomy**

For Graduate Students Only (Plant Genetics)

240. **Advanced Genetics**  
 241.<sup>o</sup> **Research in Plant Genetics**  
 242.<sup>o</sup> **Plant Breeding Seminar**  
 243. **Methods in Plant Breeding**  
 244. **Laboratory Methods in Plant Breeding**  
 246.<sup>o</sup> **Genetics Seminar**  
 248. **Applied Statistics**  
 251. **Special Problems in Application of Statistics**  
 252. **Cytogenetics**  
 253. **Methods in Plant Genetics**  
 255. **Special Topics in Genetics**  
 261. **Quantitative Inheritance I**

## Animal Husbandry (AnHu)

Students majoring in animal husbandry work out a program suited to their needs in consultation with an adviser in the department. Those whose vocational goals include farming, extension service or employment in various business enterprises related to agriculture usually follow the agricultural science curriculum. Students who plan to take postgraduate work in preparation for teaching and research at the college level or for research in industry are advised to follow the science specialization curriculum. Among the courses recommended for majors are: AnHu 8 or 58, 30, 36, 36A, 37, 37A, 60 or 61, 62, 63, 64 or 65 and courses in various related fields.

1. **Introductory Animal Husbandry.** Opportunities in livestock production. Survey of methods followed in the production of livestock. Lectures and laboratory practice in selecting, classifying, and appraising beef cattle, sheep, and swine. (4 cr)
8. **Breeds of Livestock.** Origin, development, characteristics, adaptations, and economic importance of the common breeds of beef and dual-purpose cattle, sheep, and swine. Judging practice in selection of breeding animals. (4 cr; prereq soph, 1)
9. **Livestock Judging.** Lectures and practice in judging beef cattle, sheep, and swine. (3 cr; prereq 8)
30. **Meat Selection and Utilization.** Cuts of beef, pork, lamb, and veal, their utilization, nutritive value, chemical composition, and grades. Aging, curing, smoking, freezing, and processing of meats. (3 cr; prereq soph)
31. **Meats.** Slaughter of meat animals; cutting, pricing, and grading of beef, lamb, and pork carcasses. (3 cr; prereq 1, 30)
36. **Livestock Feeding I.** Nutritional requirements of farm animals and composition and characteristics of livestock feeds. Differences in utilization of feeds by ruminants and nonruminants. (3 cr; prereq 1...AgBi 3 recommended)
- 36A. **Livestock Feeding I (Laboratory).** Practical experience in the use of tables on nutrient composition of feedstuffs and on nutrient requirements of farm animals. (1 cr; prereq 36 or 36A)



37. **Livestock Feeding II.** Values of individual feeds and of combinations of feeds for beef cattle, sheep, swine, and horses. Feeding of farm livestock for most economical production of livestock products. (3 cr; prereq 36)
- 37A. **Livestock Feeding II (Laboratory).** Practical experience in use of data on composition of feedstuffs in the formulation of balanced rations for farm animals. (1 cr; prereq 37 or 37)
53. **Advanced Meats.** Grading, classification, and judging of beef, pork, and lamb carcasses and cuts. Trips to the South St. Paul packing plants for practice sessions. Intercollegiate judging team selected from this class. (3 cr; prereq 31)
58. **Market Classes and Grades of Livestock.** Marketing methods; stockyards operation; government standards; market reporting; sanitary regulations; transportation problems. Practice in classifying, grading, and evaluating market cattle, sheep, and swine. Visits to the South St. Paul livestock market. (3 cr; prereq 1)
- 60-61.† **Current Topics in Animal Husbandry.** Reports on current topics in animal husbandry. (1 cr per qtr; prereq sr in animal husbandry)
62. **Animal Breeding.** Applications of the physiology of reproduction and genetics to breeding of farm animals. (3 cr; prereq Agro 30 or equiv)
63. **Swine Production.** Adaptability, breeding, feeding, care, and management of commercial and purebred swine. (3 cr; prereq 37, 37A, 62 or #)
64. **Sheep Production.** Adaptability, breeding, feeding, care and management of commercial and purebred sheep. (3 cr; prereq 37, 37A, 62 or #)
65. **Beef Cattle Production.** Adaptability, breeding, feeding, care and management of commercial and purebred beef cattle. (3 cr; prereq 37, 37A, 62 or #)
66. **Introduction to Animal Nutrition.** Basic concepts of animal nutrition, nature of requirements, functions of various nutrients, nature of deficiencies, and critical evaluation of reports of scientific investigations in the field. (3 cr; prereq 37, AgBi 6 or #)
70. **Feeds and Feeding Practices.** (Same as DyHu 70) Nutrient requirements of farm animals. Characterization of feeds and their use in rations for beef and dairy cattle, sheep, swine, and horses. Lectures and problems. (3 cr; prereq student in veterinary medicine; offered 1961-62 and alt yrs)
101. **Livestock Selection.** Advanced training in selection and judging of livestock. Visits to stock farms. Intercollegiate Judging Team selected from this class. (3 cr; prereq 9 or #)
107. **Meat Problems.** Wholesale cuts and grades of meat; the processing industry and merchandising establishments. (3 cr; prereq 53)
162. **Animal Breeding.** (See AnHu 62) (3 cr; prereq Agro 30 or equiv)
163. **Swine Production.** (See AnHu 63) (3 cr; prereq 37, 37A, 62 or #)
164. **Sheep Production.** (See AnHu 64) (3 cr; prereq 37, 37A, 62 or #)
165. **Beef Cattle Production.** (See AnHu 65) (3 cr; prereq 37, 37A, 62 or #)
166. **Introduction to Animal Nutrition.** (See AnHu 66) (3 cr; prereq 37, AgBi 6 or #)

**For Graduate Students Only**

- 201.\* **Advanced Animal Breeding I**
204. **Quantitative Inheritance II**
205. **Quantitative Inheritance III**
- 208, 209, 210.\* **Animal Husbandry Seminar**
211. **Experimental Methods**
- 213.\* **Research in Animal Husbandry**
- 222.\* **Energy in Animal Nutrition**
- 223.\* **Protein and Amino Acid Nutrition**
- 224.\* **Vitamin Nutrition**
- 225.\* **Mineral Nutrition**
- 226.\* **Ruminant Nutrition**

## Biometrics (Biom)

90. **Introductory Statistics.** Elementary statistical concepts, use, presentation and interpretation of data, elementary probability and introduction to testing procedures. (3 cr; prereq college algebra or #)
100. **Introduction to Statistical Analysis I.** Introduction to statistical procedures in agricultural research; tests of significance, simple regression and correlation analyses, introduction to analysis of variance. (4 cr; prereq college algebra and Biom 90 or grad)
101. **Introduction to Statistical Analysis II.** (Continuation of Biom 100) Emphasis upon application of statistical methods to experimental research; multiple regression and correlation, covariance and extension of analysis of variance techniques. (4 cr; prereq Biom 100 or equiv)

### For Graduate Students Only

201. **Experimental Design**

## Dairy Husbandry (DyHu)

Students interested in the dairy husbandry curriculum work out a program best suited to their needs with a department adviser. Those students interested in dairy farming or employment in any of the business enterprises related to agriculture usually enroll in the agricultural science curriculum. Students planning post-graduate study may want to follow the science specialization curriculum.

Recommended courses for majors include: DyHu 5, 9, 11, 19, 49, 51, 105, 121, 122, 123; DInd 2, 10, 109 and courses in other related areas.

1. **Elements of Dairying.** (Same as DInd 1) An introduction to the dairy field with emphasis on fundamental concepts as they apply to dairy cattle, milk production, the processing of milk and the manufacture of milk products. Lectures and demonstrations. (3 cr)
5. **Dairy Husbandry Practice.** Dairy husbandry practices and methods. Includes 2 months of work on an approved farm, or in a testing or breeding organization. Reports required of work done. (3 cr; prereq soph, consent of adviser in dairy department)
9. **Dairy Cattle Judging.** Analysis of anatomy, physiology, and genetics of dairy animals on the basis of score card interpretations. Trips made to one or more dairy herds in the area. (1 cr)
11. **Milk Production.** Fundamental problems associated with dairy herd development, management, and milk production. (5 cr)
19. **Elementary Dairy Cattle Management.** Laboratory exercises in feed handling, clipping cows for clean milk production, dehorning, hoof trimming, care of calves, operation of milking machines, milking techniques, and sanitation practices on the dairy farm. (1 cr)
49. **Reproduction and Artificial Insemination.** A study of the fundamentals of physiology and reproduction. Includes functions of the reproductive organs, gametogenesis, fertilization, estrous cycle and its endocrine control, sire management, and the operational problems of artificial breeding. Lectures and laboratory. (3 cr; prereq 1)
51. **Classification and Evaluation of Dairy Cattle.** Type classification, production performance records, judging, evaluation of factors used in selecting breeding animals. Visits to stock farms. (2 cr; prereq 9)
70. **Feeds and Feeding Practices.** (Same as AnHu 70) Nutrient requirements of farm animals. Characterization of feeds and their use in rations for beef and dairy cattle, sheep, swine, and horses. Lectures and problems. (3 cr; prereq student in veterinary medicine; offered 1962-63 and alt yrs)
105. **Dairy Literature Seminar.** Selected topics. Dairy literature. Preparation of bibliographies. Each student presents papers and reports on assigned subjects and reviews

scientific investigations in dairy husbandry. (2 cr; prereq sr, 3 courses in dairy husbandry)

121. **Dairy Production I.** Structure and function of cow's udder including phenomenon of milk let-down, factors involved in milking, and factors affecting composition of milk. Application of principles of nutrition and economics to feeding dairy stock, including discussions of feeding standards. Feed additives, nutritional disorders, and forage utilization. (4 cr; prereq AnHu 36...37 recommended)
122. **Dairy Production II.** Methods of improving dairy cattle through application of genetic principles to breeding and selection. (4 cr; prereq 49, Agro 30 or equiv)
123. **Dairy Production III.** Application of fundamental theories and practices to dairy cattle management. Lectures and laboratory exercises are presented in the care of cows and bulls, breeding efficiency of cows and bulls, arrangement of buildings and stables; preparation of feed and bedding budgets for the dairy enterprise. (4 cr; prereq 49)
149. **Reproduction and Artificial Insemination.** (See DyHu 49) (3 cr; prereq grad or #)
199. **Special Problems.** Research in the area of dairy husbandry under supervision of a senior staff member. A written and an oral report of accomplishments, presented before the departmental staff, is required. (1-3 cr per qtr; may be repeated; prereq #)

#### For Graduate Students Only

202. **Research in Dairy Production**
217. **Dairy Cattle Inheritance**
218. **Review of Advances in Nutrition and Feeding of Dairy Cattle**
219. **Dairy Cattle Reproduction**
220. **Lactation**
222. **Energy in Animal Nutrition**
223. **Protein and Amino Acid Nutrition**
224. **Vitamin Nutrition**
225. **Mineral Nutrition**
226. **Ruminant Nutrition**

## Dairy Industries (DInd)

1. **Elements of Dairying.** (Same as DyHu 1) An introduction to the dairy field with emphasis on fundamental concepts as they apply to dairy cattle, milk production, the processing of milk, and the manufacture of milk products. Lectures and demonstrations. (3 cr)
2. **Elements of Dairying Laboratory.** Principles and practical application of routine analyses for the composition of milk and its products; sampling techniques; standardization problems. (2 cr; prereq 1)
3. **Dairy Products Judging.** Introduction to the organoleptic examination of milk and its products; fundamentals of taste and odor perception; identification and evaluation of defects in dairy products. Lectures and laboratory. (1 cr; prereq soph)
4. **Dairy Products Practice I.** Practical training and experience in some phase of the dairy industry. Includes a minimum of 2 months of employment in an approved position and written reports. (3 cr; prereq soph)
5. **Dairy Products Practice II.** Continuation of DInd 4. (3 cr; prereq 4)
20. **Household Microbiology.** Especially for students in home economics. Fundamental principles of microbiology, characteristics of bacteria, yeasts, molds, and other microorganisms, their importance in the preparation and preservation of foods, relation to health and well-being of the individual and the family. (4 cr; prereq 3rd qtr fr, #)
50. **Dairy Bacteriology.** Lectures and laboratory. Types of milk organisms; contamination of milk and how prevented; relation of milk to public health; bacteriology of dairy products. (3 or 5 cr [3 cr for lect, 2 cr for lab]; prereq soph, MicB 53; lect taken separately only with #; grad students may take 150)

100. **Dairy Industries Literature Seminar.** Selected topics. Dairy literature. Preparation of bibliographies. Each student presents papers and reports on assigned subjects and reviews scientific investigations in dairy industries. (2 cr; prereq sr, 3 courses in dairy industries)
101. **Condensed Milk Products.** Manufacture of condensed milk products, with special reference to the physical and chemical processes and engineering problems involved. Lectures and laboratory. (3 cr; prereq 2, 50, AgBi 10)
102. **Dry Milk Products.** Manufacture of dry milk products, with special reference to the physical and chemical processes and engineering problems involved. Lectures and laboratory. (3 cr; prereq 101)
103. **Market Milk.** Processing and distribution of market milk and related products, with emphasis on the physical, chemical, and bacteriological problems involved; organization, design, equipment, and operation of milk plants; problems of public control. Lectures and laboratory. (3 cr; prereq 2, 50, AgBi 10)
104. **Ice Cream and Frozen Dairy Foods.** Manufacture of ice cream, with special reference to chemical and physical processes involved. Organization, construction, equipment, and operation of such factories. Lectures and laboratory exercises. (3 cr; prereq 2, 50, AgBi 10)
105. **Butter.** Manufacture of butter with special reference to chemical and bacteriological processes involved. Organization, construction, equipment, and operation of such factories. Laboratory exercises. (3 cr; prereq 2, 50, AgBi 10)
106. **Cheese.** Manufacture of cheese, with emphasis on the chemical, bacteriological, and physical processes involved. Lectures and laboratory exercises. (3 cr; prereq 2, 50, AgBi 10)
107. **Technical Control of Dairy Products.** Chemical and bacteriological laboratory methods used in technical control of milk and its products. Lectures and laboratory. (3 cr; prereq sr, 50, 105, or 106, AgBi 10)
130. **Advanced Dairy Products Judging.** (Continuation of DInd 3) Emphasis on evaluating the market quality of dairy products and the use of official grading procedures. (1 cr; prereq 3)
150. **Dairy Bacteriology.** (See DInd 50) (3 cr; prereq grad or #, MicB 53)
151. **Advanced Dairy Bacteriology.** Investigations of specific problems on the bacteriology and mycology of milk and dairy products. (3 cr; prereq sr, 50 or equiv, 105 or 106)

**For Graduate Students Only**

- 205, 206, 207, 208, 209. Research in Dairy Manufacturing  
 212, 213, 214, 215, 216. Research in Dairy Bacteriology

## Entomology and Economic Zoology (Ent)

Two fields of specialization are available in this department: (a) entomology, and (b) fishery and wildlife. Students interested in the fishery or wildlife fields should consult the fishery and wildlife management curriculum (see Index). Students interested in the field of entomology should register in the science specialization curriculum (see Index), taking zoology in the freshman year and including physics in the freshman or sophomore year, continuing with a program which emphasizes zoology and entomology, botany, and chemistry.

There is a strong demand for well-trained entomologists in the fields of teaching, research, public service, and industry. In most cases the training must include at least 1 or 2 years' study beyond the bachelor of science degree, leading to the Master's degree. Many positions are open only to applicants who have earned the Ph.D. degree.

The sequence of required and elective courses recommended for a 4-year program leading to a terminal B.S. degree in entomology or leading to graduate work in entomology can be obtained from the department on request.

1. **Insect Life.** Insects in relation to man, his crops, livestock, and products. Insect habits, biology, and classification. Problems of control. Lectures, demonstrations, and laboratory. (4 cr)
- 1A. **Biological Studies with Insects.** Studies with living insects to demonstrate biological and ecological phenomena and investigative procedures. (1 cr; prereq Biol 2, Ent 1 or Ent 1)
2. **Introduction to Fishery and Wildlife Management.** A survey of technical requirements and training of fishery and wildlife technicians and scientists; introduction to fields of work, problems, and career outlets. (1 cr)
- 21F. **Principles of Beekeeping.** Life history, morphology, and physiology of the honeybee. Colony development. History of beekeeping. Equipment and apiary management. Chemistry and food value of honey. Pollination. Diseases of bees and their control. Economics of beekeeping. (3 cr)
- 21S. **Principles of Beekeeping.** Same as Ent 21F with addition of practical laboratory and apiary work. (5 cr)
50. **Economic Entomology.** Life histories, habits, and methods of control of the insect pests of livestock, orchard, fields, and garden. Laboratory work in determination of the more important forms. (5 cr; prereq Biol 2 or equiv or Ent 1)
51. **Introductory Animal Parasitology.** Elementary course dealing with parasitic protozoa, worms, and arthropods, and their relation to diseases of man and animals. (5 cr; prereq Biol 2 or equiv)
52. **Introductory Entomology.** General morphology, life histories, habits, and classification of insects. (5 cr; prereq # for soph, Biol 2)
55. **Entomological Techniques.** Practical laboratory instruction in mounting, preservation of insect larvae; preparation of microscopic mounts of minute insects; labeling, classifying, and cataloguing specimens of insects for scientific study. (1-3 cr; prereq 52 or equiv)
56. **Forest Entomology.** Lectures and laboratory dealing with the principles of controlling insects that attack trees and forest products; life history and habits of important representative species. (4 cr; prereq Biol 2 or equiv)
63. **Mammalogy.** Distinguishing characteristics and life histories of the various mammal groups, particularly those represented in the state. (4 cr; prereq Zool 22)
64. **Fishery and Wildlife Populations.** Introduction to fishery and wildlife population principles with reference to factors of abundance. Lecture and library work. (3 cr; prereq Biol 2 or equiv, Bot 50, or For 5)
65. **Fishery and Wildlife Management.** Survey of management of fishery and wildlife resources with a discussion of principles and administration. Lectures and library work. (3 cr; prereq 64)
67. **Techniques of Forest Wildlife Management.** Largely field work; use of censuses applicable to major local forms of forest wildlife; preparation of a wildlife management plan for a small forested area. (2 cr; prereq 64; given at Cloquet)
114. **Apiculture.** Honeybee anatomy, physiology, nutrition, diseases, and breeding; colony development and management; processing and marketing of bee products; pollination. Lectures, laboratory, and field practice. (3 cr; prereq 9 cr entomology or biology)
116. **Population Ecology.** General principles of population, covering population dynamics and trophic relationships. (3 cr; prereq Zool 65 or #; offered 1961-62 and alt yrs)
117. **Field Ecology.** Field work in major and minor communities in Minnesota; extended field trips to neighboring states. (3 cr; prereq Zool 65 or #... Bot 50 or 130 or equiv recommended; offered 1962-63 and alt yrs)
118. **Animal Ecology.** Experimental approach to study of environmental factors affecting animal populations. (3 cr; prereq 9 cr in general biology or equiv and 3 cr in animal or plant ecology, #)
119. **Limnology.** Conditions for life in the water and distribution of aquatic animals. (4 cr; prereq 9 cr in general biology or equiv; offered in Biology Session at Itasca)
121. **Ichthyology.** Taxonomy and habits of North American fishes, with special reference to those of upper Mississippi drainage. Lectures and laboratory. (3 cr; prereq 9 cr in general biology or equiv, #)

125. **Insect Morphology.** Comparative studies of the external and internal macrostructure of insects, including phylogeny and function. (4 cr, §Zool 125; prereq 52, #)
126. **Microanatomy and Development of Insects.** Histochemistry and fine structure; reproductive behavior, embryology, and postembryonic development of insects. (4 cr, §Zool 126; prereq 125, OrCh 42 or 62, #)
127. **Insect Metabolism and Co-ordination.** Homeostasis, permeability, circulation, metabolic systems and products, properties of muscle and nerves, sensation, behavior. (4 cr, §Zool 127; prereq 126, #...AgBi 106 or PhCh 101 recommended)
128. **Aquatic Entomology.** Identification and biology of aquatic and littoral insects in all stages. (2 cr; prereq 52 or equiv)
130. **Principles of Systematic Entomology.** Lectures on the history of systematic entomology, the species concept, and higher categories, systematic procedures and zoological nomenclature. (2 cr; prereq 15 cr entomology or zoology and #)
140. **Biological Microscopy.** Necessary elements of optics, use and limitations of the various types of microscopes, interpretation of microscopical data. Laboratory: demonstration plus project in field of student's interest. (4 cr; prereq sr, 9 cr in general biology or equiv, #; offered when demand warrants)
141. **Insects in Relation to Plant Diseases.** (Same as PIPa 141) Insect transmission and dissemination of plant pathogens; development of plant-insect relationships; habits of principal insect vectors with emphasis on practical methods of control. (3 cr; prereq 5 cr in entomology and 5 cr in plant pathology or equiv, or #)
144. **Medical Entomology.** Principal arthropods noxious to man and animals. Emphasis on those that serve as vectors of pathogenic organisms of man and animals. Lectures and laboratory. (3 cr; prereq 9 cr in general biology or equiv and 52 or equiv, #)
145. **Parasitic Protozoa.** Structure, life histories, and economic relations of protozoal parasites of man and animals. Lectures, laboratory diagnosis. (3 cr; prereq 9 cr in general biology or equiv, #)
146. **Helminthology.** Worm parasites of man and animals, their structure, life histories, and biological relationships. Lectures and laboratory. (3 cr; prereq 9 cr in general biology or equiv, #)
150. **Economic Entomology.** Life histories, habits, and methods of control of the insect pests of livestock, orchard, fields, and garden. Laboratory and field work. (3 cr; prereq grad or #, 52 or equiv)
152. **General Entomology.** Morphology, life histories, habits, and classification of insects. (3 cr; prereq grad or #, Biol 2 or equiv)
156. **Advanced Forest Entomology.** Analysis of major problems in forest entomology. Lecture, laboratory, and library work. (3 cr; prereq 9 cr, #)
166. **Wildlife Management Techniques.** Lectures, laboratory, and field work on wildlife research and management techniques. (3 cr; prereq 63, 65, Zool 58, Bot 50, or #)
171. **Techniques in Fishery Biology.** Basic methods used in fishery research and management; lake and stream survey methods, mapping, chemical and biological sampling; methods of fish collection, use of nets and traps, fish toxicants, electrofishing; tagging and marking; methods of creel census. (3 cr; prereq 65, 119, 121 or #)
175. **Principles of Economic Entomology.** Methods and principles of insect control. Lectures and laboratory demonstration. (4 cr; prereq 15 cr in entomology incl 50 or equiv or #; offered 1962-63 and alt yrs)
179. **Recent Advances in Entomology.** Lectures in special fields of entomological research given by visiting professor. (Cr and hrs ar; prereq sr)
197. **Introduction to Research.** Special problems involving library and laboratory research in various lines of entomology and economic zoology. (1 or more cr; prereq sr, Δ)

For Graduate Students Only (Entomology)

200x. Seminar

201-204.\* Research in Systematic Entomology

205-208.\* Research in Insect Transmission of Plant Diseases

213-216.\* Research in Insect Ecology

- 217-220.\* Research in Forest Entomology
- 221-224.\* Research in Economic Entomology
- 225-228.\* Research in Insect Physiology
- 229-232.\* Research in Insect Histology
- 236.\* General Ecology of Insects
- 242.\* Insect Physiology
- 244.\* Insect Microbiology
- 257. Insecticides and Their Action
- 258.\* Insecticides Laboratory
- 259.\* Experimental Ecology Laboratory
- 261-264.\* Research in Medical Entomology
- 265-268.\* Research in Insecticides
- 269-272.\* Research in Apiculture

For Graduate Students Only (Fishery and Wildlife Management)

- 237-240.\* Research in Fishery Biology
- 248-249.\* Fishery Biology and Management
- 250.\* Fisheries Resources of the United States
- 251.\* Fishery Habitats and Development
- 273-276.\* Wildlife Management
- 277-280.\* Research in Wildlife Biology

## Food Technology (FTec)

The marked technological progress which has taken place in the food processing industries in recent years has created a large demand for trained personnel to select raw materials, to control manufacturing operations, to solve technical problems related to the palatability, nutritive value, public health safety, and keeping quality of foods, and to develop new methods and processes. Food technologists also find employment in teaching and research work in colleges and universities, in federal and state laboratories, in sales and technical services, in allied industries which supply packaging and other materials, and in such auxiliary services as advertising, purchasing materials, and marketing research.

Students who desire to qualify for a professional career in food science and technology should register in the science specialization curriculum and select a course program in consultation with the faculty advisory committee on food technology. An adequate foundation in the basic sciences of mathematics, physics, chemistry, and biology must first be acquired. By appropriate selection of the major field and of electives, the student may acquire training in the technology of fruits and vegetables, poultry, meat and dairy products as well as in chemical engineering, in microbiology, biochemistry, or other special fields.

Since a thorough background is required in so many branches of pure and applied science, it is impossible for a student to acquire a sufficiently detailed and intensive training in a 4-year curriculum for the more challenging and rewarding positions in special areas of food technology. For this reason postgraduate work is strongly recommended.

- 51-52.‡ **Food Analysis.** Chemical and physical methods of analysis of foods and food products. (2 cr per qtr; prereq AgBi 3, AnCh 57; offered when demand warrants)
- 101-102.‡ **Food Technology.** Application of biochemistry and biology to food manufacturing, including effect of processing on chemical composition and nutritive value, methods of food preservation, food bacteriology, molds and fungi, insect and rodent control, food acceptance, chemical engineering operations in the food industries, food

- packaging. (3 cr per qtr; prereq AgBi 3, 5, and 6 or #, MicB 53, and a course in physics; offered when demand warrants)
104. **Frozen Food Processing and Storage.** (Same as Hort 104) Technology of food preservation by freezing. Study of changes occurring during handling, freezing, and storage. Application to processing, packaging, distribution, and storage. (3 cr; prereq AgBi 5 or 6 or 10, MicB 53 or #)
105. **Frozen Food Problems.** (Same as Hort 105) Special problems based upon work given in FTec 104. (2-4 cr per qtr with 9 cr total; prereq 104 or #)

## Forestry (For)

1. **Introduction to Forestry.** Brief survey of the various fields of forestry and the forest situation in the United States and the world. Lectures, reports, and reading. (1 cr)
- 1A. **Conservation of Natural Resources.** Natural resources of the United States and the world; their utilization, interrelationship, and management treated from an economic standpoint and related to their importance to society and our responsibility for their conservation. Lectures, reports, and assigned reading. (3 cr)
2. **Important Forest Plants.** Identification and classification of the important forest plants of Itasca State Park, with emphasis on forest site and type, plant indicators. (2 cr; given at Lake Itasca Forestry and Biological Station)
4. **Dendrology.** Forest trees of the United States; their classification, characteristics, and range. Lectures, laboratory, and assigned reading. (4 cr; prereq Biol 2 or ¶Biol 2, or course in botany)
5. **Forest Ecology.** Ecological factors and principles as a basis for silviculture. Establishment, development, and structure of forest stands. (4 cr; prereq Biol 2, or course in botany; given at Lake Itasca Forestry and Biological Station)
6. **Field Forest Measurements.** Field work and report preparation. Woods surveying including measurement of distance by pacing and chain, running lines with a compass, field mapping; measurement of diameters and heights, tree measurements; timber estimating methods; stem analyses; site and stand-density determination. (2 cr; given at Lake Itasca Forestry and Biological Station)
7. **Elements of Forest Measurements.** Measurements of forest products in cubic feet, cords, board feet, and by the piece; log rules; curve fittings; construction of volume tables; elementary methods of compiling and analyzing forestry data; report preparation. (3 cr; prereq Math T)
8. **Timber Estimating and Forest Surveys.** Principles and methods of timber estimating and forest surveys; sampling methods in forestry; growth prediction; measurement of permanent plots; report preparation. (3 cr; prereq 7)
10. **Farm Forestry.** Place of forestry on the farm. Tree identification. Care of woodlots. Establishment and maintenance of windbreaks, shelterbelts, Christmas trees, and erosion control plantings. Measuring, marketing, and use of wood on the farm. Lectures and laboratory. (3 cr; not open to forestry majors)
47. **Introduction to the Forest Economy.** An examination of the world and United States forest economics; aggregate domestic product demand, supply and consumption, statically and through time; qualities of and relations among sectors; industry and consumer characteristics; aggregate production goals; macro problems of forest economy. (2 cr; prereq AgEc 2 or #)
51. **Logging.** Principles and general methods of logging in the different forest regions of the United States, and the modifications required by forest management. (2 cr)
55. **Fire Protection.** Prevention, presuppression, and suppression phases of forest fire control. Fire behavior and effects. Use of fire in land management. (2 cr)
59. **Introduction to Forest Aerial Photogrammetry.** Use of aerial photographs, preparation of planimetric and vegetative type maps. Photo interpretation and applications to resource management. (3 cr; prereq Biol 2, Soil 3 or Geol 1, Math T)
60. **Forest Engineering.** Field work in forest road location and construction to specification; compass and mapping problems to demonstrate the Public Land Survey under forest conditions. (2 cr; prereq MeAg 42; given at Cloquet)



61. **Introduction to Forest Recreation.** Recreational use of forest land and its relation to other uses. Field problems. (1 cr; given at Cloquet)
62. **Forest Policy.** Discussion of current forest policy problems. (1 cr; given at Cloquet)
- 75-76. **Wood Structure and Identification.** Structure, classification, and identification of domestic commercial woods. Lectures, laboratory, and reading. (4 cr; prereq 4)
77. **Forest Products.** Introductory survey of forest products; lumber, naval stores, tannins, wood pulp, paper, etc. Lectures, reading, reports. (3 cr)
78. **Forest Products Quality Standards.** Grades and specifications of forest products including lumber, ties, logs, plywood, siding, shingles, veneer, poles, piling, and principles of writing specifications for industrial cut-products and parts. (2 cr, §58; prereq 76 or ¶76)
79. **Strength of Wood Materials.** Derivation and application of formulas used in determining stress in wood. Lectures, problems, and reading. (3 cr; prereq 76, Math 10)
80. **Timber Testing Laboratory.** Methods in timber testing. Problems and reports. (2 cr; prereq 79)
81. **Wood Drying.** Theory and practice of air drying, kiln drying, and new developments in the drying of wood. (3 cr; prereq 76)
82. **Wood Preservation.** Lectures and collateral reading of the history, development, and methods of wood preservation. Different systems now in use and preservatives used. (3 cr; prereq 76 and organic chemistry)
83. **Wood Finishing.** Painting and natural finishing of wood, including chemical and physical principles involved in the formulation and application of finishes, preparation of surfaces, etc. (3 cr; prereq organic chemistry)
85. **Glued Wood Products.** Wood working machines and machining of wood preparatory to gluing. Familiarization with properties, uses, and testing of adhesives and glued products. (3 cr, §57; prereq 76 or ¶76)
86. **Wood Fiber and Particle Products.** Properties, uses, and application of hardboards, particle boards, insulation products including industrial cushioning and home insulation. (3 cr, §57; prereq 76, 85 or ¶76, ¶85)
87. **Building Materials Merchandising.** Functional examination of wholesale and retail store operations including purchasing, storage, inventory, pricing, store and yard layout, display, sales, and administration. (3 cr, §58; prereq 123, 18 credits in business administration)
88. **Building Cost Estimating.** Methods and techniques involved in estimating materials and labor requirements as well as blueprint reading and drafting. (3 cr; prereq 78, MeAg 7, Ind 9)
101. **Advanced Dendrology.** (Continuation of For 4) Special studies in classification and distribution of some important timber species of the world. (3 cr; prereq 4)
104. **Watershed and Range Management.** Climatic, vegetational, and historical factors affecting watershed and range management in the United States. Principles underlying management of the forested watershed including the influences of woody vegetation upon soil moisture, stream flow, and erosion. Fundamentals of range land management for sustained production of livestock forage with consideration of its relation to other land uses. (4 cr; prereq 5 or #)
111. **Application of Statistical Methods in Forestry.** Introduction to the use of statistical methods to sampling in timber estimating and to compile, analyze, and interpret forestry data. (3 cr; prereq 8 or #)
123. **Production and Marketing.** Elementary considerations in the long and short run production and marketing of representative kinds of products; principles of decision-making in micro forest economic situations. (4 cr; prereq 47 or 147)
124. **Forest Management.** Acquisition, organization, and administration of forest lands. Application of forest science in management planning. (3 cr; prereq 123)
127. **Introduction to Silviculture.** Description and classification of the forests of the United States. Silvicultural treatment of some important forest types. (3 cr; prereq 4 and 5)
128. **Silviculture.** Lectures and field laboratory to demonstrate the cutting methods and cultural practices used in American forestry; survey of seeding and planting princi-

- ples, with field planting, nursery work, and plantation evaluations. (6 cr; prereq 127; given at Cloquet)
131. **Forest Policy.** Public and private forest policies in the United States. Forest policies of other nations. Analysis of current policy issues. (3 cr; prereq sr)
  133. **Forest Management and Utilization.** Observation and analysis of state, federal, and private forestry operations with field trips and assigned readings; trips through forest products processing plants. (2 cr; prereq 124; given at Cloquet)
  134. **Forest Inventory and Photographic Interpretation.** Use of aerial photographs; delineation of forest cover types, acreage measurement, cruise designs, preparation of maps, and field cruising. (3 cr; prereq 59 and 111 or Biom 90; given at Cloquet)
  136. **Forest Economics.** Lecture and seminar presentations in any of the areas of forest and forest products economics. (3 cr; prereq sr, 123 and #)
  137. **Forest Tree Seed.** Important tree seed problems encountered in natural regeneration and nursery work; origin, production, storage, and germination. (2 cr; prereq Biol 2 or a course in botany)
  140. **Advanced Forest Management.** Advanced economic, administrative, and biologic problems of forest land management. Current techniques. Problems of increasing intensity of management. Lectures and reports. (3 cr; prereq sr, 124)
  141. **Principles of Silvics.** Principles underlying the silvical characteristics of trees and reactions of trees to their environments. Review of silvical literature of special significance. (3 cr; prereq sr, 127)
  143. **Forest Recreation.** Recreational use of the forest from a technical point of view. Problems of land management arising from recreational demands. (3 cr)
  145. **Advanced Silviculture.** A synthesis of silviculture knowledge through a review of the classical as well as recent contributions to silvicultural literature. Topical presentations and class discussion. (3 cr; prereq sr, 128)
  146. **Advanced Forest Aerial Photogrammetry.** Photogrammetric systems, flight planning, contracting, contract inspection; advanced photo interpretation, mapping, and measurement problems. (3 cr; prereq sr, 59 or #)
  149. **Advanced Forest Measurements.** Applications of statistical and advanced mensural methods in the analysis and interpretation of forestry data and forest survey sampling methods. (3 cr; prereq 111 or #)
  150. **Forest Genetics.** Heredity and variation of important forest-tree species; applications of genetic principles in tree improvement. (3 cr; prereq Agro 30 or 131, or #)
  154. **Advanced Watershed Management.** A study of the recent literature relating to management of the forested watershed. Methods of analyzing research data. (3 cr; prereq 104 or #)
  156. **Introduction to Research.** Research philosophy, objectives, problem development, analytical principles, and presentation, illustrated by situations in forestry. (3 cr; prereq sr and #)
  175. **Wood Pulp and Paper.** Detailed study of production of wood pulp and paper products. Lectures, reading, and reports. (3 cr; prereq 76 and organic chemistry)
  176. **Timber Engineering.** The fabrication and use of the timber truss and laminated arches and beams in building construction. Timber connector, nailed, bolted, and nail-glued wood joints. (4 cr; prereq 79)
  177. **Wood Chemistry.** Chemical composition, reaction, and analyses of wood components and derivatives. Chemical technology of wood and wood products. (3 cr; prereq 76, organic chemistry)
  178. **Woody Tissue Microtechnique.** Use of sliding and rotary microtomes, hand sectioning, maceration; differential staining, and special techniques in preparation of woody tissue for microscopic study. (4 cr; prereq 76 or #)
  181. **Moisture Relations in Wood.** Study of moisture movement in wood related to the micro-physical and chemical structure and its influence on the development of stress during drying and subsequent use. (3 cr; prereq 81, 177)
  182. **Advanced Wood Preservation.** Study of factors governing toxicity, permanence, and effectiveness of wood preservatives to fungi, insects, and marine borers. Study of fire retardant and treatments. The permeability of wood, penetration of preservatives and heat transfer. (3 cr; prereq 82)

183. **Advanced Wood Finishing.** Laboratory study of industrial applications of wood finishes. (2 cr; prereq 83; offered when feasible)
184. **Advanced Wood Chemistry.** Laboratory problems in the analysis of wood constituents and in the techniques of their isolation and purification. (2 cr; prereq 177, AnCh 57 or equiv; offered when feasible)
185. **Principles of Adhesion in Manufactured Wood Products.** Theory of adhesion as applied to wood and to combinations of wood with other materials. (3 cr; prereq 86, 177)
187. **Advanced Building Materials Merchandising.** Lecture and seminar presentations in the areas of retailing, wholesaling, market analysis, and research. (3 cr; prereq 87, BA 107)
195. **Advanced Wood Pulp and Paper.** Laboratory problems in the properties of wood pulp and of paper products. (2 cr; prereq 175, AnCh 57 or equiv; offered when feasible)
199. **Senior Seminar.** Discussions and presentation of papers on forestry problems, work experience, employment opportunities. (1 cr; prereq sr)

*For Graduate Students Only*

- 200x. **Research Problems in Silviculture**
- 203x. **Research Problems in Forest Management**
- 205x. **Research Problems in Forest Economics**
- 207x. **Research Problems in Forest Products Engineering**
- 213x. **Research Problems in Forest Utilization**
- 218x. **Research Problems in Forest Measurements and Photogrammetry**
- 220x. **Research Problems in Forest-Tree Genetics**
- 221x. **Research Problems in Forest Influences**
- 222x. **Research Problems in Forest Policy**
- 223-224-225. **Seminar**
- 226-227. **Seminar: Statistical Methods in Forestry Research**

## Home Economics (HE)

### *Orientation and Trends in Home Economics*

10. **Introduction to Home Economics.** Orientation of beginning students in field of home economics. (1 cr; prereq fr only)
195. **Development of Home Economics.** Discussion of the development of home economics with emphasis upon current problems. (2 cr)

### *Food*

40. **Food Preparation.** Development of technique, application of fundamental science principles to cookery processes and preservation. Establishment of good standards for food products. (5 cr; not open to srs; prereq 3rd qtr fr, 2 qtrs chemistry)
41. **Food Management and Marketing.** Determination and study of management factors in the food problems of the homemaker and consumer. Quality, cost, and conservation of foods. Meal planning, preparation, and service. (5 cr; prereq soph, 31, 40)
70. **Advanced Food Preparation.** (Continuation of HE 40) Emphasizes the scientific principles that underlie cookery processes and food preservation. (3 cr; prereq 40, AgBi 1A)
71. **Demonstrations.** Purposes and techniques of food demonstrations with special reference to their application in business. (1 cr; prereq 3rd qtr jr, 41)
88. **Introduction to Food Quality Evaluation.** Survey of some of the current procedures in appraising quality of food products. (3 cr; prereq 40, 70, AgBi 1A)

137. **Modern Food Preparation Principles and Practices.** Experimental bases of principles underlying present day food preparation practices; development of experiences illustrative of such principles in high school teaching, dietetics, and foods in business. (3 cr; prereq 15 cr in food and nutrition, organic chemistry)
138. **Food Purchasing.** Cost factors, quality standards, informative labels, food laws, economy of new trends in food processing. (3 cr; prereq 15 cr in food and nutrition, principles of economics)
140. **New Developments in Food Preparation.** Survey of recent trends in food preparation. (3 cr; prereq sr, 40...70 recommended)
141. **Current Literature in Foods.** Lectures and discussion of recent literature dealing with food products and preparation. (3 cr; prereq sr, 40 or equiv)
142. **Experimental Cookery.** Intensive study of problems in foods and food preparation by means of individual laboratory problems. (3 cr; prereq 40, AgBi 1A)
144. **Topics in Experimental Foods.** Assigned readings, reports, and discussions of topics in experimental foods. (2-3 cr; prereq OrCh 42 or equiv, 15 cr in food and nutrition)
146. **Special Food Problems.** Class problems in foods and food preparation. (3 cr; prereq sr, 142)
188. **Evaluation of Food Quality.** Subjective and objective methods frequently used in measuring the quality of food products. (3 cr; prereq AgBi 1A, InCh 11 and AnCh 57, HE 142, Biom 90 or 100)

#### For Graduate Students Only

246. **Developments in Experimental Foods**
247. **Special Food Problems**
- 249x.\* **Seminar in Foods**
- 295x-296x.\* **Home Economics Problems**

### *Dietetics and Food Service Management*

30. **Introduction to Nutrition.** Discussion of the application of principles of nutrition to the selection of food. (2 cr, §GC 3B, or §PNur 14, or §HE 31; intended for students majoring in fields other than home economics [open to HE students only by #]; given on Mpls Campus)
31. **Introduction to Nutrition.** Application of nutrition principles to the food selection of college students. Includes information on relation of food to the promotion and maintenance of health. (3 cr, §GC 3B, or §HE 30; not open to HE srs)
33. **Nutrition I.** Introduction to (a) chemistry of carbohydrates, lipids, and proteins, (b) enzymes, (c) vitamins, (d) digestion, and (e) absorption. (4 cr; prereq soph, AgBi 1A or OrCh 42, and Phsl 4 or ¶Phsl 4)
35. **Nutrition II.** Introduction to (a) carbohydrate, lipid, and protein metabolism, (b) blood, (c) urine, and (d) endocrine organs. (4 cr; prereq soph, 33)
63. **Quantity Food Purchasing and Production.** Selection, preparation, serving, and cost accounting of different types of foods and food products. Organization of special banquets. (5 cr; open to 3rd qtr soph; prereq HE 41; two 4-hr labs, two 1-hr lects)
64. **Food Service Equipment.** Purchasing and maintenance of equipment related to the storage, preparation, and service of food in quantity. Arrangement and layout of food service area. (4 cr; prereq 63; 3 hrs lect, 3-hr field trip)
65. **Food Service Organization and Management.** Survey of general types of food service and related administrative problems including menu planning, business procedures, personnel management, food cost control, and food merchandising. (3 cr; prereq 63; 3 hrs lect)
66. **Administrative Food Service Experience.** Planned experience in selected type of food service including menu planning, purchasing and storage of food, supervision of preparation and serving and maintenance of high sanitary conditions, accounting and bookkeeping. (5 cr; prereq 65; 15 hrs lab per wk per qtr or can be taken during 1 summer term, 30 hrs per wk for 5 wks)

72. **Nutrition.** Discussion of the application of the principles of nutrition to the selection of food. (2 cr, §GC 3B, §PNur 14, or §HE 31; intended for students majoring in fields other than home economics [open to HE students only by #]; prereq jr; given on Mpls Campus)
76. **Nutrition of the Family.** Principles of nutrition and the problems of food selection most commonly met in everyday living. (4 cr, §170 and 171; prereq 31, 40, physiology or human biology)
79. **Selected Problems for Dietitians.** Problems related to the work of the dietitian, involving discussions, readings, and special assignments. (3 cr; prereq HE students, 170 or equiv)
160. **School Lunch Management.** Discussion of problems of the home economist who is responsible for quantity food service; includes menu planning, food production, purchasing of food and equipment, personnel management, and the organization of special banquets. (3 cr; prereq 31 or equiv, 41 or food preparation and meal management, principles of economics)
170. **Nutrition Principles.** Fundamental principles of human nutrition and their application in promotion and maintenance of optimal health. (3 cr; prereq 31, 40, AgBi 1A, Phsl 4)
171. **Maternal and Child Nutrition.** Lectures and discussions dealing with principles of maternal and child nutrition and with formation of desirable food habits. Observation of children at mealtime is included. (3 cr; prereq 170, HEEd 90)
172. **Current Developments in Nutrition.** Fundamental facts and techniques for solving current nutrition problems. (3 cr; prereq sr, 31, 40, AgBi 1A, Phsl 4 or #)
173. **Diet Therapy.** Lectures, discussions, assigned readings, etc., concerning fundamental principles involved in use of diet for treatment of certain disease conditions. (4 cr; prereq 170...35 recommended)
174. **Nutrition Topics.** Assigned readings, reports, and discussions of nutrition topics. (1 cr; prereq 170)
175. **Nutrition.** Tissues and tissue metabolism as well as work on blood, milk, and urine. (4 cr; prereq sr, 33, InCh 11 and AnCh 57)
176. **Advanced Nutrition.** Selected quantitative methods applicable to investigation relating to digestion and metabolism. (4 cr; prereq 35 or ¶35, InCh 11 and AnCh 57)
177. **Digestion and Metabolism.** Selected problems relating to digestion and metabolism; lectures, readings, and laboratory. (3 cr; prereq 35)
178. **Clinical Problems in Nutrition.** Application of nutrition information to problems in health and disease involving assigned readings, discussions, and experience in a diabetic clinic. (2 cr; prereq 170, 35, or ¶35)
179. **Readings in Nutrition.** Survey of literature in the field, oral and written reports. (2 cr; prereq 170)

#### For Graduate Students Only

- 270-271. Principles of Human Nutrition  
 279x.\* Seminar in Nutrition  
 295x.-296x.\* Home Economics Problems

### *Home Management and Family Living*

17. **Personal and Family Living.** Democratic family living; characteristics of different age-levels; development of personality and of family unity; conditioning effects of family living. Discussion of problem situations of the individual and the family. (3 cr; not open to jrs or srs)
85. **Home Management Principles.** Managerial aspects of homemaking; work simplification of household activities; financial records and budget-making for the individual and the family. (3 cr; prereq 40 [41 recommended], AgEc 2)
86. **Home Management Laboratory.** Residence for ½ quarter in 1 of the 2 home management houses, with direct experience in managing and sharing activities and responsibilities. (4 cr; prereq 85 or ¶85...41 recommended; deposit of \$10 required)

- 86A. **Home Management Laboratory.** (4 cr; prereq #)
185. **Family Relationships.** Factors that promote satisfaction in family living, and inter-relationships of the family and the community. (3 cr; prereq 17, HEEd 90 or #)
186. **Problems in Income Management.** Specific aspects of financial management for the individual and for the family. Readings, discussions, and field work. (3 cr; prereq 76, 85, or #)
187. **Readings in Family Relationships.** Independent study in selected areas with faculty conferences. (1-3 cr; prereq #)
190. **Family Relationships Colloquium.** Review of research, and discussions; designed for graduate students, but available to high scholarship seniors with consent of instructor. (1 cr per qtr with 2 cr total; prereq 185, or 15 cr in child development, psychology, and/or sociology)

For Graduate Students Only

295x-296x.° Home Economics Problems

*Household Equipment*

49. **Household Equipment.** Principles that should guide in the selection, operation, care, and convenient arrangement of equipment in the home. (3 cr; prereq soph, MeAg 35 or #)
131. **Laboratory Problems in Household Equipment.** Laboratory course on procedures and instruments used to determine operating characteristics of household appliances. (3 cr; prereq 49 or equiv course in equipment and a total of 8 credit hours in food, clothing and textiles, or #)
133. **Topics in Household Equipment.** Assigned readings, reports, and discussion of topics in household equipment. (1-2 cr; prereq 49, total of 15 cr in physics, food, clothing, and textiles, or #)
- 189A, B, C. **Construction and Use Characteristics of Household Appliances.** Thermal and electrical characteristics of cooking, refrigerating, and laundry equipment and other home appliances. Convenience characteristics of the equipment. A: Ranges, refrigerators, and freezers. B: Selected electric and nonelectric appliances and housewares. C: Washers, dryers, combination washer-dryers, water heaters, water softeners, and ironers. (3 cr per qtr; prereq 131)

For Graduate Students Only

289. Seminar in Household Equipment

295-296. Home Economics Problems

*Related Art*

20. **Introduction to Related Art.** Development of an appreciation of art involved in everyday life of student; cultivation of taste in varied fields such as home furnishings and architecture. Arts and crafts of various countries studied briefly for their contribution to student's breadth of view, enjoyment, and understanding of other cultures. (3 cr)
21. **Color and Design.** Laboratory experiences in the selection and arrangement of home furnishings, selection and framing of pictures, lettering, poster making, block printing. (3 cr; prereq 20)
22. **Beginning Costume Design.** Opportunity to plan suitable and becoming costumes for different personality and figure types. Study of regional costume. (3 cr; prereq 1, 20...21 recommended)
23. **Design Problems.** Experience in creative designing, with emphasis on the relation of design to materials, techniques and their uses. (3 cr; prereq 21, Art 20 or 23)
24. **Problems in Home Planning and Furnishing.** Exteriors and interiors of houses studied for their design and suitability to family and locality. Problems in planning and furnishing a home worked out on basis of family living. Class work in combining

- fabrics, furniture, and accessories in rooms. Field trips. (5 cr, §GC 3D, §FamS 15; prereq soph, 20...21 and 49 recommended)
25. **Design Applied to Crafts.** Emphasis upon well-designed and suitable articles for use in dress and in the home which can be made with simple equipment, such as weaving, metal and leather work. (3 cr; prereq 20...21 recommended)
28. **Construction and Refinishing of Home Furnishings.** Laboratory problems in refinishing and reupholstering furniture and making of slip covers and draperies. Emphasis on design. Techniques suitable for homemakers, extension workers, and homemaking teachers. Students furnish own materials. (3 cr; prereq #)
56. **Applications of Color and Design I.** Color and design applications in various areas, including problems relating to dress. Arts and crafts of other countries as background for appreciation and standards for judging quality. Arrangement of display cases. Content tailored to individual needs. (3 cr, §20; not open to HE students; offered when demand warrants)
57. **Applications of Color and Design II.** (Continuation of HE 56) Emphasis upon house planning and furnishing problems. Arrangement of rooms and display cases. (3 cr, §24, §180 or §FamS 15; not open to HE students; prereq 20 or 56, or #; offered when demand warrants)
58. **Supervised Retail Training.** Combines experience in several departments of a store on Saturdays and planned discussions during two class periods each week. Supervision and evaluation of student work by both store personnel and instructor. (4 cr; prereq 21, 22, 50 or §50, Psy 2, #)
120. **Art History.** Art from the Egyptian period to present. Painting, sculpture, and architecture of the past studied for influences on contemporary period. Field trips. (3 cr)
121. **Textile Design.** Historic and modern textile designs and designers. Original designs applied to textiles by means of silk screen, batik, and block print techniques. (3 cr; prereq 23, 50 or #)
- 122A. **Interior Design Presentation.** Methods of rapid rendering for interiors in various mediums. Presentation techniques for traditional and modern interior details. (3 cr; prereq Art 20 or 23, HE 24)
- 122B. **Interior Design Problems.** Interiors designed and rendered in a variety of mediums; color schemes planned with fabrics. Intensive study of color and fabrics. Studies and reports on trends in interior design, contemporary designers and their contributions to the home furnishings field, other topics of practical and historic interest. Field trips to shops, buildings, and homes. (3 cr; prereq 120, 122A, 123 or #...180 recommended)
123. **History of Home Furnishings.** Historic styles in home furnishings with their corresponding styles in exteriors; effect of historic styles on contemporary design in home furnishings. (2 cr; prereq 120 recommended)
125. **Advanced Costume Design.** Problems in draping and sketching clothing designs. Pencil, crayon, and water color techniques, studies and reports on selected topics. (3 cr; prereq 3, 22, or #)
126. **Special Problems in Crafts.** Advanced study in area of crafts; weaving, enameling, leatherwork, metalwork, or other. One area may be selected for study, or a combination of two or more. (1-3 cr; prereq 20, 25 or #)
127. **Purchasing Home Furnishings.** Detailed study of home furnishings in terms of use, cost, and appearance. Includes furniture, dinnerware, floor and wall coverings, fabrics, and accessories. Actual materials, slides, and references used. Field trips. (3 cr; prereq 24, 50)
128. **History of Costume.** Primitive to contemporary styles. Reports. (2 cr; prereq 22, 120 or #)
180. **Advanced Home Planning and Furnishing.** Problems in planning and furnishing a home to meet family needs. Aesthetic, economic, social, and managerial aspects considered. Each student develops a plan for a house and its furnishings based on family living. Field trips. (3 cr; prereq 24, 49...120 recommended)
181. **Housing Problems of the Family.** Plans for both urban and rural homes, with evaluation of economic, art, and social aspects. Discussions, field trips, and classroom analyses. (3 cr; prereq 24)

For Graduate Students Only

- 220x.° Readings in Related Art  
 221. Special Problems in Textile Design  
 227x.° Special Problems in Home Planning and Furnishing  
 229x.° Seminar in Related Art  
 295x-296x.° Home Economics Problems

*Textiles and Clothing*

1. **Choice and Care of Clothing.** Principles of planning, selecting, and caring for the wardrobe. Design and color as they relate to dress and personal appearance. Some textile knowledge of help to the consumer. (3 cr, §GC 3C; not open to srs or men)
3. **Clothing Construction A.** Cutting, fitting, pressing, and construction of selected garments, using a variety of fabrics; commercial pattern interpretation and fitting, garment alteration, and sewing machine maintenance. (3 cr; prereq 3rd qtr fr, 1)
4. **Clothing Construction B.** Fitting a dress form lining; construction of a dress in which various techniques of pattern fitting, pattern redesigning, and garment fitting are applied; design and construction of a second garment. (3 cr; prereq soph, 3)
50. **Textiles.** Consumer textile problems; characteristics of fibers, fabrics, and finishes; selection, maintenance, and serviceability of fabrics for clothing and home furnishings; laboratory study of selected fabrics. (4 cr; prereq 3rd qtr soph, InCh 5 or NSci 2 or GC 7C, or #)
52. **Introduction to Textiles.** Factors which influence the quality and value of fabrics used in men's and women's wearing apparel and household furnishings. Designed primarily for students in merchandising. (3 cr; for non-HE majors; offered when demand warrants)
53. **Advanced Clothing.** Problems in designing and tailoring a fitted, lined wool jacket; use of a plaid or striped fabric in the designing and construction of a garment; social and economic problems involved in children's clothing. (3 cr; prereq 4, 50 or §50)
54. **Problems in Clothing Construction.** Major emphasis on construction techniques, designing, or fitting; problems in pattern modification, draping, and the construction and evaluation of clothing illustrative material. (3 cr; prereq 53 or #; offered when demand warrants)
102. **Advanced Textiles.** Nature of textile raw materials; economic, chemical, and physical problems involved in their manufacture and use; measurement and significance of physical characteristics of yarns and fabrics. (3 cr; prereq 50, AgBi 1A or OrCh 42, AgEc 2 or §AgEc 2)
107. **Textile Analysis.** Application of quantitative methods in analysis of textile materials, with special reference to fiber composition and finishes. (3 cr; prereq 50, AgBi 1A or OrCh 42, InCh 11 and AnCh 57)
115. **Economic and Social Aspects of Clothing.** Trends in clothing consumption; factors influencing consumer demand for clothing; clothing expenditure patterns; psychological, sociological, and economic aspects of fashion in dress; clothing industry. (3 cr; prereq 50, AgEc 2 or Econ 2, Soc 1A or 1, Psy 2, or #)
116. **Family Clothing Problem.** Influence of family composition, income, and occupation on family clothing; clothing in relation to family goals and values; theories of consumer behavior, decision making, and management in the solution of family clothing problems. (3 cr; prereq 50, AgEc 2 or Econ 2, Soc 1A or 1, Psy 2, or #)
152. **Problems in Consumer Textiles.** Contemporary textiles, their physical characteristics in relation to end use performance; agencies aiding consumer through development of standards; problems students have met in the textile field. (3 cr; prereq 50 or equiv; offered when demand warrants)
154. **Pattern Design and Alteration.** Principles of flat pattern designing, pattern alteration, modification of commercial patterns, and principles of fitting. Course develops versatility in use of commercial patterns and gives experience in designing original



garments. Development of individual master pattern. (3 cr; prereq 4 or equiv, 22 or equiv, or #)

155. **Experimental Studies in Clothing Construction.** Comparison of selected procedures in clothing construction; evaluation of suitability for use in teaching at secondary, college, and adult levels. Individual experimental problems and class reports. (3 cr; prereq 53, tchg exper, #)

For Graduate Students Only

201. Readings in Textiles and Clothing  
 202. Animal Fibers  
 204. Plant and Other Cellulosic Fibers  
 208. Microanalysis of Textile Fibers  
 209x.<sup>o</sup> Seminar in Textiles and Clothing  
 295-296x.<sup>o</sup> Home Economics Problems

## Home Economics Education (HEEd)

(College of Education)

90. **Child Development.** Growth and development of children and problems in training. Emphasis on the preschool child. Observations of children. (3 cr; prereq soph, Psy 1-2)
91. **Observation, Materials, Teaching in Home Economics.** Philosophy of the home economics program; students' needs and interests; teaching materials, curriculum guides and unit construction; development of home economics in the school program. (5 cr; prereq HE 4, 21, 41, Ed 55A-B, ¶HEED 93)
92. **Teaching Problems in Home Economics.** Teaching procedures; management of home-making department, space and equipment; relationship of teacher to school, community, and profession. (2 cr; prereq sr, 91, 93, ¶94, 192, and 194A)
- 93-94. **Supervised Teaching in Home Economics.** Observation, participation, and actual teaching experience under supervision in different home economics situations and on different age levels. In second quarter student spends a month in a selected school in the state. (3 cr for 93, 6 cr for 94; prereq HE 4, 21, 41, Ed 55A-B)
95. **Field Experience for Home Agents.** Observation, participation, and actual experience under supervision in the agricultural extension program. Study of the program on the St. Paul Campus and participation in a selected county program with a home agent. A written report summarizing the experience required. (6 cr; prereq 91, 93, permission of head of HEEd and director of Agricultural Extension)
190. **Readings in Home Economics Education.** Independent study under tutorial guidance. (1-3 cr; prereq #)
192. **Evaluation in Home Economics.** Measuring progress toward important goals in different areas of home economics; available tests and other evaluation materials; construction and refinement of various evaluation instruments. Elementary statistical techniques useful to home economics teachers. (2 or 3 cr; prereq sr, 91, 93, Ed 55A-B)
- 193A. **Home Economics Curriculum.** (Secondary level) Contributions of home economics at elementary and secondary levels; techniques employed in curriculum planning and reconstruction. (3 cr; prereq 94 or #)
- 193B. **Home Economics Curriculum.** (College level) The place and problems of home economics in higher education; curriculum offerings; teaching schedules and load; appropriate reference materials. (3 cr; prereq #)
- 194A. **Adult Education in Home Economics.** Objectives of adult education in home-making; problems affecting community and family life; methods of helping adults and out-of-school youth in solving problems in home living. (3 cr; prereq 91, 93 or equiv)
- 194B. **Adult Education in Home Economics.** Planning a community program; teaching procedures; special problems. For teachers, home economics extension workers, and supervisors of adult education. (3 cr; prereq sr, #)

195. **Space, Equipment, Furnishings, and Materials for Home Economics Departments.** Remodeling old and planning new departments, equipping and furnishing them. Review of research; investigation of problems. (3 cr; prereq grad or AS sr with #, 91, 93, HE 49; offered when demand warrants)
197. **Organization and Methods of Related Art Teaching.** Development of a working philosophy of related art. Courses planned and methods studied to relate art and home economics subject-matter in various aspects of home and community life. (1-3 cr; prereq sr, 91, HE 180 or equiv)
- 199E. **Internship.** Directed teaching and practice work at the graduate level for candidates for the master of education degree. (Cr ar; prereq #)

For Graduate Students Only

243. **Trends in Home Economics**
- 292.\* **Problems in Evaluation**
- 293x.\* **Problems in Home Economics Education**
- 294x.\* **Research Methods**
- 295x.\* **Seminar in Home Economics Education**

## Horticulture (Hort)

There are seven distinct fields in horticulture: vegetable growing, fruit growing, landscaping, ornamental horticulture, floriculture, turf management, and handling and processing of horticultural products. In some cases students may find it advisable to include more than one field in their major. Those who plan to enter some horticultural industry such as fruit growing, market gardening, truck growing, nursery business, greenhouse business, florist work, turf management, or handling and processing should follow the curriculum in agricultural science. Students interested in landscape gardening should take the landscaping curriculum.

Students who plan to take postgraduate work in preparation for research or college teaching are advised to follow the science specialization curriculum.

1. *Agricultural Science*—The courses listed below are recommended for students majoring in horticulture in the indicated fields.

- a. Vegetable Growing: Hort 1, 32, 41, 110, 135, 136, 138, 139; Agro 30
- b. Fruit Growing: Hort 1, 6, 36, 40, 41, 107, 110, 111, 121; Agro 30
- c. Ornamental Horticulture and Floriculture: Hort 1, 16, 21, 22, 36, 41, 51, 53, 152, 154, 110; Agro 30; PlPa 1 or 10
- d. Turf Management: Hort 1, 21, 22, 142; Agro 30; Bot 51; Ent 50; MeAg 45; PlPa 1 or 51, 3, 111, 135; Soil 19, 126, 132.
- e. Handling and Processing: Hort 104, 105.

Additional courses in such supporting fields as botany, plant pathology, entomology, soils, etc., may be added to fit the needs of individual students. Minor sequences should be arranged in consultation with the adviser.

Students in ornamental horticulture and floriculture will be expected to get 6 months of practical experience in their respective professions before graduation.

2. *Landscaping*—See landscaping curriculum, page 34.

3. *Science Specialization*—For subjects recommended for a major in some field of horticulture, consult adviser.

1. **General Horticulture.** Fruit, vegetable, and ornamental plants, including factors which influence their culture, value, and importance in Minnesota. Lectures. (3 cr)

6. **Fruit Growing.** Fundamental principles of fruit growing. Sites, soils, nursery stock, planting and planting plans, tillage, fertilization, cover crops, pollination, frost avoidance, pruning, and thinning. Lectures and references. (3 cr; prereq Biol 2 or 3 cr in botany)
10. **Ornamental Horticulture.** Designed for the student who does not plan to major in ornamental horticulture. Gives working knowledge of the propagation, culture, and uses of the common garden flowers and house plants. Lectures, laboratory, and reference reading. (3 cr)
16. **Greenhouse Management.** Fundamentals of greenhouse construction and management, soils, fertilizers, watering, ventilating, heating, lighting, shading. (3 cr; prereq Biol 2 or 6 cr in botany; offered 1962-63 and alt yrs)
21. **Plant Materials, Fall and Winter Aspects.** Trees, shrubs, and evergreens used in landscape planting, with emphasis on their fall and winter characters, their identification and uses in landscape design. Lectures, laboratory (outdoor and indoor), and field trips. (3 cr; prereq Biol 2 or 6 cr in botany)
22. **Plant Materials, Spring and Summer Aspects.** Trees, shrubs, and evergreens used in landscape planting, with emphasis on their spring and summer characters, particularly that of blooming habit. Lectures, laboratory (outdoor and indoor), and field trips. (3 cr; prereq Biol 2 or 6 cr in botany)
32. **Vegetable Growing.** Fundamental principles of vegetable growing. Scope of the industry and its place in agriculture. Varieties, seed production, regional adaptation, soils, fertilizers, equipment, storage, systems of production and marketing. (3 cr; prereq Biol 2 or 6 cr in botany)
36. **Plant Propagation.** Methods of propagating plants by seed, cuttings, layers, divisions, and grafting. Practical work in management of nursery stock, bulbs, and plants. Lectures, reference reading, and field trips. (3 cr; prereq soph, Biol 2 or 6 cr in botany)
40. **Horticultural Practices.** Lectures and practice on operations used in fruit plantings and home grounds. Planning, planting, pruning, grafting, etc. (2 cr; prereq soph, 6 or #)
41. **Horticultural Crop Judging.** Principles and practices of judging and exhibiting fruits, vegetables, and flowers. (3 cr; prereq 1, 6, or 32)
51. **Garden Flowers.** The common annual, biennial, and perennial flowers, with emphasis on their uses in landscape planting. Lectures, laboratory, reference reading, and field trips. (3 cr; prereq Biol 2 or 6 cr in botany; offered 1961-62 and alt yrs)
53. **Foliage Plants.** Identification, utilization, and culture primarily of foliage plants used in interior decoration. Lectures, reference reading, and field trips. (2 cr; prereq 16; offered 1962-63 and alt yrs)
60. **Principles of Landscape Design.** Principles of landscape design with special reference to their practical application in planning of residential landscapes. Relationships of landscape design, architectural design, and interior decoration. Landscape plans, landscape drafting techniques, and methods of presentation. Lectures, drawings, and practical problems. (3 cr; prereq 21, 22 or #)
61. **Principles of Planting Composition.** Principles of planting arrangement, the aesthetic qualities of plants, their value and uses in all kinds of landscapes and gardens; special reference to home landscapes and gardens. Lectures and problems. (3 cr; prereq 60 or #)
62. **Special Problems in Landscape Design and Composition.** Problems based upon the work given in the preceding landscape gardening courses. (2-4 cr per qtr, total 6-12 cr; prereq sr, 61 or #)
76. **Landscape Construction and Maintenance.** Survey of garden and landscape construction, materials, grading, planting, and maintenance, including plans, specification, and computation of costs. Materials and construction of walks, walls, fences, steps, pools, terraces, lawns, planting areas, flower beds, etc. Lectures, field trips, reports, and construction problems. (3 cr; prereq 60 or 61 or #; offered 1962-63 and alt yrs)
104. **Frozen Food Processing and Storage.** (Same as FTec 104) Technology of food preservation by freezing. Study of changes occurring during handling, freezing,

- and storage. Application to processing, packaging, distribution, and storage. (3 cr; prereq AgBi 5, 6, or 10, MicB 53 or #)
105. **Frozen Food Problems.** (Same as FTec 105) Special problems based upon work given in Hort 104. (2-4 cr per qtr with 9 cr total; prereq 104 or #)
107. **Orchard Management.** Detailed study of the various operations in orchards and berry fields. Operating costs and profits. Lectures, laboratory, and individual problems. (3 cr; prereq 6, hort majors or minors or #; offered 1962-63 and alt yrs)
110. **Horticultural Crop Breeding.** Principles of plant improvement, their special application to horticultural plants, and the breeding methods used with vegetables, fruits, and ornamentals. (3 cr; prereq Agro 30)
111. **Systematic Pomology.** Fruit varieties. Classification, description, identification, and elements of judging. Lectures, laboratory, and a survey of the literature. (3 cr; prereq 6, hort majors or minors or #; offered 1961-62 and alt yrs)
121. **Small Fruit Culture.** Botanical relationships, history of commercial development, and factors of environment and culture as related to small fruits. (3 cr; prereq hort majors or minors or #, 6 or 32, 9 cr botany or equiv; offered 1961-62 and alt yrs)
135. **Potatoes.** Culture, handling, storage, seed maintenance, varieties, improvement, and physiology of the potato plant. (2 cr; prereq 32)
136. **Adaptation and Maintenance of Vegetable Varieties.** Origin and development of leading varieties and their adaptation to different vegetable-producing areas. Methods of seed production and maintaining of varieties. Activities of plant breeding organizations. (3 cr; prereq 32; offered 1961-62 and alt yrs)
138. **Vegetable Crops I.** Lectures and assigned reading on the relation of light, temperature, moisture, nutrients, and other factors to the growth and culture of vegetable crops. (3 cr; prereq 32, Bot 51; offered 1962-63 and alt yrs)
139. **Vegetable Crops II.** Continuation of Hort 138. (3 cr; prereq 32, Bot 51; offered 1961-62 and alt yrs)
142. **Turf Management.** Species and varieties of grasses and cultural practices for growing turf for home lawns, golf courses, athletic fields, and various other landscape purposes. Lectures and laboratory. (5 cr; prereq Biol 2 plus 12 cr in plant sciences)
152. **Commercial Floriculture, Fall Crops.** Culture of the principal florist crops and tropical plants of economic importance. Major emphasis on chrysanthemums, carnations, cut flowers, and potted plants especially adapted to Christmas sales. Lectures, reference reading, and field trips to greenhouses, wholesalers, and retail flower stores. (3 cr; prereq 16; offered 1961-62 and alt yrs)
154. **Commercial Floriculture, Spring Crops.** Principal florist crops and tropical plants of economic importance. Major emphasis on orchids, roses, bulbous plants, and material adapted to spring sales. Lectures, reference reading, and field trips to greenhouses, wholesalers, and retail flower stores. (3 cr; prereq 16; offered 1961-62 and alt yrs)
- 190-191-192. † **Special Problems.** Problems based upon the work given in the preceding courses. (2-4 cr per qtr; prereq #)

#### For Graduate Students Only

241. **Organization of Horticultural Research**
- 242x. **Seminar**
- 243\*-244. **Advanced Topics in Horticulture**
- 247x.\* **Written Report on Special Horticultural Topics**
248. **Truck Crop Breeding**
- 249x.\* **Research in Horticultural Crop Breeding**

### **Orientation (Orie)**

1. **College Orientation Lectures.** Required of all students entering the college except those who have had 1 year or more of work in another college. Students must register for course in their first quarter in college. Discusses Land-Grant institution devel-

opment and program of the college. Gives limited attention to principles of learning and individual differences, study habits, and skills. Outlines student personnel program of college and university. (1 cr)

## Plant Pathology and Botany (PlPa)

Training in this field may lead to state and federal service, college teaching and experiment station work, and employment in a variety of commercial fields.

Two fields of specialization are available in the department: (a) plant pathology, and (b) agricultural botany.

**A. Plant Pathology**—Students interested in plant pathology will ordinarily register in the science specialization curriculum with a view to taking graduate work. A major in plant pathology in the agricultural science curriculum must have the approval of the department.

Recommended for major in plant pathology:

1. *Science Specialization*—PlPa 1 or 51, 56 or 156 or 105-106-107; 111 or 114, 115 or 116; 119.
2. *Agricultural Science*—Consult adviser in plant pathology.

**B. Agricultural Botany**—A major should include basic courses in the Department of Botany in the College of Science, Literature, and the Arts. Since the student may wish to apply his botanical training to one of several fields of horticulture, agronomy, soils, forestry, and entomology and economic zoology, subjects from these departments may also be included in the major.

A major in agricultural botany in the agricultural science curriculum must have approval of the department. A major in science specialization assumes continuation in graduate work. For courses recommended for major in both agricultural science and science specialization curriculums, consult departmental adviser.

### Plant Pathology

1. **Plant Pathology.** Introductory course in plant diseases. Lectures, laboratory, and special problems. (5 cr, §51; prereq soph, 9 cr in plant sciences with at least 6 cr in botany or Biol 2)
51. **Forest Pathology.** Diseases of forest and shade trees, and wood decay. Symptoms, etiology, and control. Lectures, laboratory, and field work. (4 cr, §1; prereq 6 cr in botany or Biol 2)
56. **Introduction to the Study of Fungi.** Structure, development, and identification of fungi, especially those of economic importance. (3 cr; prereq 9 cr in botany or Biol 2 or #)
101. **Nematodes in Relation to Plant Diseases.** Nematodes as plant pathogens; nematode taxonomy, morphology, life cycle, biology, and control; pathogenicity and host-parasite relationships; alone and in combination with other plant pathogens. (3 cr; prereq 1, 51, or 120 and 6 cr in zoology or Biol 2, or #)
104. **Industrial Mycology.** Fungi in relation to industrial processes and products. (3 cr; prereq 1 or 51 or 56; offered 1962-63 and alt yrs)
- 105-106-107.† **Mycology.** Morphology and taxonomy of fungi. Lectures, laboratory, and field work. (3 cr per qtr; prereq 1 or 51 or 56 or equiv)
111. **Diseases of Field Crops.** Diseases of field crops including symptomatology, etiology, and practical methods of control. (4 cr; prereq 1 or 51 or 120)
114. **Advanced Forest Pathology.** Wood rots, including deterioration of wood products. Lectures and laboratory. (3 cr; prereq 1 or 51 or 120)
115. **Diseases of Vegetable Crops.** Vegetable diseases, especially those important in Minnesota. Lectures, laboratory, field and greenhouse work. (3 cr; prereq 1 or 51 or 120; offered 1961-62 and alt yrs)

116. **Diseases of Fruit Crops.** Fruit diseases, especially those important in Minnesota. Lectures, laboratory, field and greenhouse work. (3 cr; prereq 1 or 51 or 120; offered 1962-63 and alt yrs)
117. **Virus Diseases of Plants.** Nature of plant viruses and types of diseases they cause; emphasis on methods for studying virus diseases. (3 cr; prereq 1 or 51 or 120; offered 1961-62 and alt yrs)
118. **Bacterial Diseases of Plants.** Bacteria as plant pathogens; representative types with particular reference to techniques used in studying bacterial diseases of plants. (3 cr; prereq 1 or 51 or 120 and 3 cr in microbiology; offered 1962-63 and alt yrs)
119. **Principles of Plant Disease Control.** General consideration of principles and practices in controlling plant diseases. (3 cr; prereq 1 or 51 or 120)
120. **Plant Pathology for Advanced Students.** General plant pathology. Lectures, laboratory, greenhouse work, and special problems. (3 cr, §1 or 51; prereq 14 cr in plant sciences or #)
141. **Insects in Relation to Plant Diseases.** (Same as Ent 141) Insect transmission and dissemination of plant pathogens; development of plant-insect relationships; habits of the principal insect vectors with emphasis on practical methods of control. (3 cr; prereq 5 cr in entomology and 5 cr in plant pathology or equiv, or #)
143. **Methods.** Theoretical and practical consideration of methods used in mycological, pathological, and physiological research. (3 cr; prereq 1 or 51)
156. **Study of Fungi for Advanced Students.** General characters of fungi, especially those used in identification; cultural and taxonomic procedures and practices. (3 cr, §56, §105, §106, §107; prereq 9 cr in botany or Biol 2 or #)

### *Agricultural Botany*

3. **Weeds and Seeds.** Identification of weed seeds and seedlings, life history and habits of weeds in relation to their control and weed laws. (3 cr; prereq 6 cr in botany or Biol 2)
53. **Food Plants of Game Animals.** Food plants; uses, habits, reproduction and identification. (3 cr; prereq 1 yr botany and 1 yr zoology or equiv)
57. **Radiobiology in Agriculture.** Discussion of the nature and effects of ionizing radiation in biological systems. The significance and consequences of radiation in the life of man, with special emphasis on the application of ionizing radiation and radioisotopes in agriculture. (3 cr; prereq jr, 10 cr in biology, 10 cr in chemistry, 5 cr in mathematics, 5 cr in physics, or #)
102. **Biology of Seeds.** Factors affecting germination, development, dissemination, longevity, and viability of crop and weed seeds; ecological factors of seed production; the relationship to seed viability of seed-borne organisms, seed treatment, and the processing and storing of seed. (3 cr; prereq 15 cr in plant sciences or #; offered 1962-63 and alt yrs)
103. **Physiology of Economic Plants.** Applications of plant physiological principles to agriculture, horticulture, and forestry. (3 cr; prereq Bot 51 or 140)
108. **Physiology of Economic Plants Laboratory.** Includes applications of advanced methods and apparatus in physiological research to agricultural problems. May be taken with or without PIPa 103. (2 cr; prereq Bot 140 with lab and quantitative analysis, or equiv)
135. **Ecology of Grasses and Grasslands.** The identification, morphology, and ecological geography of grasses and legumes in natural and agricultural habitats. (3 cr, §4; prereq 1 yr botany or equiv; offered 1962-63 and alt yrs)
136. **Physiology and Ecology of Weeds.** Factors affecting growth and distribution of weeds; chemical nature of herbicides and their effects; importance of weeds as a reservoir of insects and plant pathogens; ecological relationships of weeds. Lectures, laboratory, and greenhouse work. (3 cr; prereq 3 or equiv; offered 1961-62 and alt yrs)
137. **Animal Diseases and Poisonous Plants.** (Same as VMC 137) Systematic study of important plants poisonous to animals. Special emphasis is placed on identification, toxicology, diagnosis, and treatment. (3 cr; prereq #)

161. **Technology of Fruits and Vegetables.** Methods used in transporting, storing, and ripening of fruits and vegetables and the chemical and physiological changes that occur during storage and ripening in tissues of economic plants. Lectures and laboratory. (3 cr; prereq 15 cr in plant sciences or #)
162. **Temperature Relations of Crop Plants.** General temperature effects, with special emphasis on low temperatures and the prevention of low temperature injury. Lectures and laboratory. (3 cr; prereq 15 cr in plant sciences or #)

*For Graduate Students Only*

- 203x.° **Research in Plant Pathology**  
 207x.° **Problems in Mycology**  
 211. **History of Plant Pathology**  
 213x.° **Seminar in Plant Pathology**  
 214. **Radioisotope Techniques Applied to Biology**  
 215. **Genetics of Plant Pathogens**  
 216. **Physiology of Plant Pathogens**  
 217. **Ecology of Plant Pathogens**  
 218. **Principles of Plant Pathology**  
 251x.° **Seminar in Agricultural Botany**  
 254x.° **Research Problems in Applied Plant Physiology**  
 260x. **Research Problems in Agricultural Botany**

## Poultry Husbandry (PoHu)

Students whose major interests lie in the fields of poultry production, processing, and distribution, and in education should follow the curriculum in agricultural science. Those interested in research on postgraduate work should follow a specified curriculum in science specialization. Vocational opportunities appear in such areas as (a) private business, (b) extension, teaching, and research in state colleges and experiment stations and the federal government, (c) supervisory and regulatory work, and (d) service work or research in industry.

Recommended courses for majors in:

1. Agricultural Science—PoHu 1, 51, 52, 102, 153, 154; AnHu 62; VBac 129; AgBi 6; AgEc 25, 40; Agro 30.
2. Science Specialization—Consult adviser.

1. **Poultry Production.** Introduction to poultry industry and to principles underlying poultry flock management. (3 cr)
51. **Hatchery Management.** Principles of incubation; commercial incubators and factors affecting hatchability; practice in chick, poult, and goose sexing; problems in hatchery operation. (3 cr; prereq 1, Biol 2)
52. **Poultry Selection.** Practice in selection for standard and production qualities of poultry. (3 cr; prereq 1)
53. **Poultry Feeding.** Practical approach to elementary poultry feeding practices, including formulation and nutritional deficiency symptoms. (2 cr; prereq 1)
55. **Special Problems.** Special individual assignments in poultry husbandry. (1-3 cr; prereq 6 cr and #)
57. **Commercial Egg Operations.** The managerial aspects of commercial egg production are reviewed including both practical and technical phases of production and marketing. (3 cr; prereq 1; offered 1962-63 and alt yrs)
59. **Commercial Turkey Production.** Turkey management, reproduction, marketing, and related cost factors. (3 cr; prereq 1; offered 1962-63 and alt yrs)

- 102. Poultry Breeding.** Application of the principles of genetics and physiology of reproduction to the breeding of poultry. (4 cr; prereq 1, Agro 30; offered 1961-62 and alt yrs)
- 105-106. Comparative Vertebrate Physiology.** General concepts of the interrelationships between habitat, morphology, and organ systems and their changes through evolutionary processes. General coverage of all vertebrate classes with specific reference to the fowl. (3 cr per qtr; prereq VPP 41 or # for 105, 105 and VPP 42 or # for 106; 105 offered 1962-63 and alt yrs, 106 offered 1961-62 and alt yrs)
- 153. Poultry Nutrition.** Study of nutrients and requirements, ration formulation, and current feeding practice of chickens and turkeys. (3 cr; prereq 1, AgBi IA or equiv)
- 154. Poultry Products.** Technology involved in the grading, processing, packaging, storage, and merchandising of poultry, meats, and eggs. Lecture, laboratory, and field worked. (3 cr; prereq 1)

For Graduate Students Only

- 214x.\* Research: Poultry Husbandry
- 215x.\* Research: Poultry Nutrition
- 216x.\* Research: Poultry Breeding
- 217x.\* Seminar
- 218.\* Research: Poultry Products
- 222.\* Energy in Animal Nutrition
- 223.\* Protein and Amino Acid Nutrition
- 224.\* Vitamin Nutrition
- 225.\* Mineral Nutrition

## Rhetoric (Rhet)

All students in the College of AFHE are required to take the following courses in rhetoric: Freshman Communications; Public Speaking (Rhet 22); Exposition (Rhet 51); and 9 hours of humanities or its equivalent. Additional requirements as to number of hours and specific courses depend upon the particular curriculum for which the student is registered.

The Rhetoric Department also offers elective courses in literature, original writing, speech, and dramatics.

1. **Communications I.** Diagnostic tests in listening, reading, speaking, and writing. Sectioning and specialized training according to individual needs. Core assignments integrating the use of all four skills. Progress tests. Re-examination to determine what further training in communication is needed for attainment of the level of proficiency required of college freshmen. (3 cr)
2. **Communications II.** Expository communication. Balanced training in adapting the four communication skills to the presentation and assimilation of oral and written materials of expository nature. Note-taking, outlining, written papers, oral reports. (3 cr; prereq placement test)
3. **Communications III.** Persuasive communication. Balanced training in adapting the four communication skills to the presentation and critical analysis of oral and written materials of a persuasive nature. Argument, evidence, and documentation. Brief-writing and persuasive speaking. (3 cr; prereq placement test)
22. **Public Speaking.** Practical course in fundamentals of speech making. Emphasis upon organizing the speech and projecting it to the audience. (3 cr; prereq rhet comm req or equiv)
25. **Parliamentary Procedure.** Parliamentary procedure applied to group organization and management. Duties of officers and disposition of motions emphasized. Individual participation stressed through role playing and other workshop procedures. (1 cr)



26. **Original Writing.** Intended for students interested in creative writing including essays, short stories, and popular articles. (3 cr; prereq rhet comm req)
28. **Literature of the Theater.** A reading of dramatic literature from Greek days to present, with emphasis on the reflection of cultures and values. (3 cr; prereq rhet comm req)
31. **Poetry and Drama.** Careful reading and analysis of selected poems and plays from English and American literature. Emphasis on increasing comprehension and enjoyment of literature. (3 cr; prereq rhet comm req)
32. **Novel and Short Story.** Careful reading and analysis of selected English and American fiction. Emphasis on increasing comprehension and enjoyment of literature. (3 cr; prereq rhet comm req)
33. **American Life in American Literature.** Analysis of philosophical and social concepts that have shaped American culture, as reflected in literature. (3 cr; prereq rhet comm req)
41. **Humanities: The Enlightenment.** The development of rationalism, humanism, individualism. Readings in Pope, Mandeville, Voltaire, Locke, Rousseau, Hume, Tolstoy. (3 cr)
42. **Humanities: The Industrial Revolution.** The classical economists and the romantic response. Readings in the classical, utopian, and Marxian economists, the romantic poets, Zola, and Dostoyevsky. (3 cr; prereq 41)
43. **Humanities: Age of Darwin.** Clash between science and religion, the Victorian compromise, and the superman. Readings in the evolutionists, Nietzsche, Shaw, and Thomas Mann. (3 cr; prereq 41)
44. **Humanities: The American Experience.** The development of major trends in American thought with particular emphasis on the impact of European ideas. Puritanism, agrarianism, transcendentalism, pragmatism, social Darwinism, collectivism. (3 cr; prereq 41)
47. **Efficient Reading.** Designed to increase reading rate, comprehension, and vocabulary. for persons of average or above-average reading ability who wish to achieve or maintain superior scholastic status. Not a remedial course. (3 cr; SLA students see *Bulletin of the College of Science, Literature, and the Arts*)
51. **Exposition.** Essays; semitechnical and technical articles; application letters. Review of usage and study of style. Required of all students unless exempted through examination given by department. (3 cr; prereq rhet comm req)
52. **Technical Writing.** Methods of exposition in technical writing; types of reports; continuous practice in report writing. Designed to enable students to meet later professional responsibilities. (3 cr; prereq 51)
54. **Advanced Public Speaking.** Training for specific speech situations most likely to be encountered professionally soon after graduation. Psychology of communication especially as related to use of visual aids, demonstration, performance method, and radio. (3 cr; prereq 22)
56. **Discussion Methods.** (Formerly Rhet 12) Study of and practice in structured and unstructured discussion. Emphasis on group dynamics and the psychology of leadership. Practice in leading meetings, debating, planning radio programs, organizing in-service training programs, evaluating group progress. (3 cr; prereq rhet comm req)
59. **Play Production.** Problems of directing, staging, and makeup. Representative plays. Each student is required to produce a play in central staging. Practical course for teachers and extension workers. (3 cr; prereq rhet comm req)
60. **Contemporary Life and Literature.** Reading and analysis of important books of current period. (3 cr; prereq rhet comm req)
91. **American Speech for Foreign Students.** Primarily for graduate students who wish to improve their command of oral English. Individual attention; laboratory procedure. Audio-visual equipment used to expedite work in vocabulary, enunciation, and pronunciation. (No cr; 3 hrs per wk)
151. **Report and Thesis Writing.** For graduate students and for seniors anticipating graduate work. Organization of reports and theses; library investigation; presentation

of data; methods of documentation. Emphasis upon revision of manuscripts and improvement in style of writing. (3 cr; prereq 51 or #)

**For Graduate Students Only**

**251. Seminar in Listening Comprehension**

## Soils (Soil)

Soils majors in either agricultural science or science specialization are expected to take a minimum of 15 credits in soils and AnCh 57 or its equivalent. Agricultural science majors should select, with the help of the adviser, a sufficient number of elective courses in related sciences to complete the major sequence. In the science specialization curriculum, majors will be expected to take additional courses in botany, chemistry, geology, and physics. In either case the subjects will be somewhat dependent upon the objective of the course of study being pursued.

1. **Soil Management and Conservation.** Nature and properties of soils. Principles of soil fertility and conservation as they apply to land use and management. Lecture, laboratory. (4 cr)
3. **Forest Soils.** Origin and classification of forest soils; factors of soil formation; forest soil organisms; forest floor; physical and chemical properties; soil water and erosion control; management of forest nursery soils. (3 cr; prereq soph, InCh 5)
- 3A. **Field Forest Soils.** Soil texture, structure, consistence, reaction, and color. Field study and description of soil profiles. Use of soil maps in forestry. (1 cr; given at Lake Itasca)
- 3B. **Forest Soils Laboratory.** Laboratory study of selected physical, chemical, and microbiological properties of soils. (1 cr; prereq 3 or ¶3)
19. **Intermediate Soils.** A study of basic physical, chemical, and microbiological properties of soils. Soil genesis, classification, and principles of soil fertility. Lectures, laboratory. (4 cr; prereq InCh 5)
20. **Interpretation of Soil Information.** Methods of soil fertility evaluation; soil tests, and their use in fertilizer and lime recommendations; fertility demonstration techniques. Lectures, laboratory. (3 cr; prereq 1 or 3 or 19, InCh 5)
21. **Soils of Minnesota.** Characteristics and location of major soils of Minnesota; soil survey; aerial photo interpretation; use and interpretation of soil maps. Lecture, laboratory. Field trips at student expense. (3 cr; prereq 1 or 3 or 19, InCh 5)
22. **Soil Conservation.** Soil and water conservation as related to tillage, cropping, soil type, climate, and slope. Farm and watershed planning. (3 cr; prereq 1 or 3 or 19 or 119)
- 52-53. **Current Topics in Soils.** Assigned reading, reports, and discussions on soil topics. (1 cr per qtr; prereq 1 or 3 or 19)
119. **Intermediate Soils.** (See Soil 19) Graduate students will be required to do extra work. (4 cr; prereq InCh 5)
121. **Soils of Minnesota.** (See Soil 21) Graduate students will be required to do extra work. (3 cr; prereq 1 or 3 or 19)
123. **Fertilizers.** History of the fertilizer industry; manufacture, characteristics, and use of important fertilizer nutrients. (3 cr; prereq 3 or 19 or 119 or #)
125. **Soil Development and Classification.** Soil profile characteristics; influence of parent material, climate, topography, vegetation, and time on soil development; system of soil classification; and world distribution of major soil groups. (3 cr; prereq 21 or 121 or #)
126. **Soil Physics.** Soil structure, compaction, tilth, tillage; water infiltration, retention, availability, movement, and evaporation; heat capacity, flow; air porosity, diffusion, deficiency effects on plants, drainage requirement. Lectures and laboratory. (4 cr; prereq 3 or 19, Math 10 and MeAg 23 or equiv)

- 127. Soil Microbiology.** (Same as MicB 103) Bacteria, fungi, and actinomycetes of the soil, with emphasis on the biochemical activities of the soil microflora. (4 cr; prereq MicB 53, 8 cr in organic chemistry and #)
- 128. Soil Chemistry.** Chemical composition of soils; organic matter; mineral matter; ionic exchange; plant nutrients and factors affecting their availability. (3 cr; prereq 3 or 19 or 119)
- 128A. Soil Chemistry Laboratory.** Methods of chemical analysis in soils. (2 cr; prereq 128 or ¶128)
- 130. Special Problems in Soils.** Research, readings, instruction. (2-4 cr; prereq 1 or 3 or 19 or 119)
- 131. Physical Chemistry of Soils.** Selected topics in physical chemistry as related to soils. Electrokinetic phenomena, colloidal behavior, interactions of organic and inorganic soil materials. (3 cr; prereq physical chemistry or #)
- 132. Soil Fertility.** Plant root-soil relationships; chemistry of essential elements in the soil and plant; diagnosing soil deficiencies. (3 cr; prereq 3 or 19 or 119)
- 133. Microclimatology (Soils).** The study of meteorology and climatology in relation to the soil-atmosphere interface with particular emphasis on the microclimate; physical processes taking place within the microclimate; modification of the microclimate by agricultural practices; weather instruments and use of climatic data. (3 cr; prereq Math 10, MeAg 23 or equiv)
- 134. Organic Soils.** Formation, classification, and properties of organic soils; their use and management. Lectures and laboratory. (3 cr; prereq 3 or 19 or 119; offered 1961-62 and alt yrs)

**For Graduate Students Only**

- 202x.\* Research Problems in Soils**
- 203x. Seminar in Soils**
- 204x.\* Advanced Soil Science**
- 214. Radioisotope Techniques Applied to Biology**

**Courses in College of Veterinary Medicine Primarily  
for Students in Agriculture**

- VAna 143. Avian Gross and Microscopic Anatomy.** Gross and microscopic anatomy of the chicken and certain significant anatomical areas of other fowl. (5 cr)
- VBac 130. Poultry Hygiene.** General anatomy of the fowl, physiology of digestion and reproduction, and prevention and control of the more important diseases affecting poultry. (3 cr; prereq Biol 2, PoHu 1, MicB 53; offered 1961-62 and alt yrs)
- VMC 52. Animal Hygiene.** Principles of animal health and disease, with emphasis on prevention, control, and eradication. (5 cr)
- VPP 41. Systemic Mammalian Physiology I.** Lectures and demonstrations in general physiology, respiratory, cardiovascular, renal, and gastrointestinal physiology. (4 cr; prereq Biol 2, InCh 5, OrCh 42, AgBi 3 or ¶AgBi 3)
- VPP 42. Systemic Mammalian Physiology II.** (Continuation of VPP 41) Emphasis on endocrinology and environmental physiology. (2 cr; prereq 41, AgBi 6 or ¶AgBi 6)

## Courses Offered by Other Colleges but Scheduled on the St. Paul Campus Primarily for Students in College of AFHE

To reduce intercampus travel and to enrich and make more flexible the offerings available to students on the St. Paul Campus, a number of courses offered by colleges, schools, or departments located on the Minneapolis Campus are scheduled on the St. Paul Campus. Included are the following courses or groups of courses.

- Geog 150. Rural Geography.** Geographic components and assemblages of rural settlement. World regional occupation and production patterns and the geographic problems of rural settlement and agricultural production on the American scene. (3 cr; prereq 10 cr in geography or major in agriculture or forestry; offered fall qtr)
- Hist 145. American Agricultural History.** European backgrounds of American agriculture, Indian agriculture, colonial agriculture in the North and South, the Southern plantation system, Middle Western agriculture, agriculture in the various sections since the Civil War, agricultural protest movements, the Federal government and agriculture, historical aspects of the agricultural surplus, the World Wars and agriculture, land tenure, changes in agricultural life, mechanization and agriculture, agricultural improvements, agricultural leaders, and the agricultural press. (3 cr; offered alt spring qtr beginning 1961)
- Math Y. Higher Algebra.** Essentially the equivalent of the second year of high school algebra. Included: factoring, fractions, linear equations and systems in 1 or more unknowns, determinants of order 2 and 3, graphing, exponents, radicals, ratio, proportion, variation, quadratic equations. (3 cr; prereq 1 yr elementary algebra)
- Math T. Trigonometry.** Analytical trigonometry emphasizing identities, equations, and properties of the functions; right and oblique triangles without logarithmic computation. (3 cr; prereq plane geometry and either Y or 1 yr high school higher algebra; open for credit even to students with high school trigonometry)
- Math 10. College Algebra.** Systems of quadratic equations, progressions, permutations, combinations, probability, binomial theorem, mathematical induction, inequalities, theory of equations, determinants, logarithms, slope of a line. (5 cr; prereq plane geometry and Y or high school higher algebra)
- Mus 43Sf-44Sw-45Ss. St. Paul Campus Chorus.** Prepares for at least one public appearance each quarter as well as for special events connected with the St. Paul Campus. (1 cr per qtr; prereq #)
- Physical Education for Men and Women.** Courses in physical education for men and women are scheduled for fall, winter, and spring quarters in the St. Paul Campus gymnasium. Offerings are listed in the *Class Schedule* under section on Physical Education: nonprofessional, undergraduate courses for men (PEM) and undergraduate courses for women (PEW). Present St. Paul Campus offerings include: *Men*—Archery, golf, handball, swimming, tennis, bowling; *Women*—badminton, golf, posture and exercise, swimming, tennis, bowling.
- Pol 119A. Rural Local Government.** Historical and legal foundations, units of government, organization and administration, functions, finance, politics and elections, problems and prospects of rural local government. (3 cr; intended primarily for prospective rural teachers, extension workers, and students in AFHE; prereq 2 or 5, or #; offered 1961-62 and alt yrs)
- PubH 52. Home Nursing and Family Care.** Nursing care and observation of patient; equipment of sick room; care of mother and baby. (1 cr; prereq home economics students, 50 or 3 or #)
- Soc 1A. Man in Modern Society.** Characteristics of human group life. Analysis of factors associated with development of human group life and man's social environment; structure of social environment and its influence upon individual's behavior. (3 cr)
- Soc 14A. Rural Sociology.** Presentation of factual data concerning human relations in rural areas within the framework of current theories of human behavior. (3 cr)

**Soc 161. Rural Community Analysis.** Emphasis is placed on tools, techniques, and methods of making community field studies. Especially for all persons interested in rural community organization, rural teaching, extension work, and related fields. (3 cr; prereq sr, 1, or #)

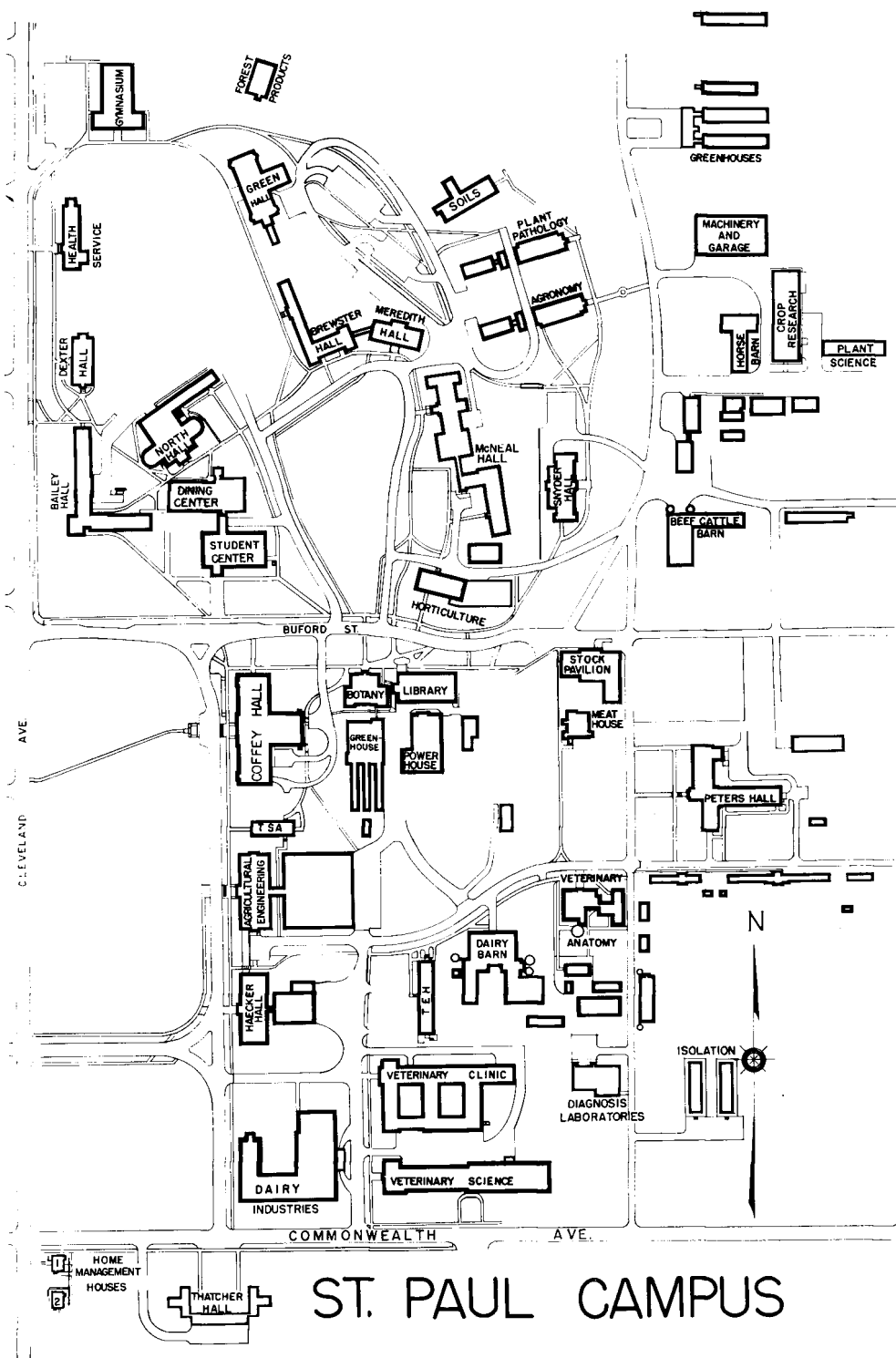
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